CHNOLOGY DEPT.

TELEPHONE and Management ENGINEER

US 8
#11

NOVEMBER
1954

THE NATIONAL TELEPHONE MAGAZINE

Featuring in This Issue—

★ MODERN CABLE CONSTRUCTION, *by John S. Reed*
★ DESIGNING MODERN COMMUNICATION LINES, *by J. N. Petrie*
★ MEASURING CABLE & WIRE CLEARANCES, *by John S. Reed*
★ HOW TO-DO-IT SUGGESTIONS, *by John G. Reynolds*
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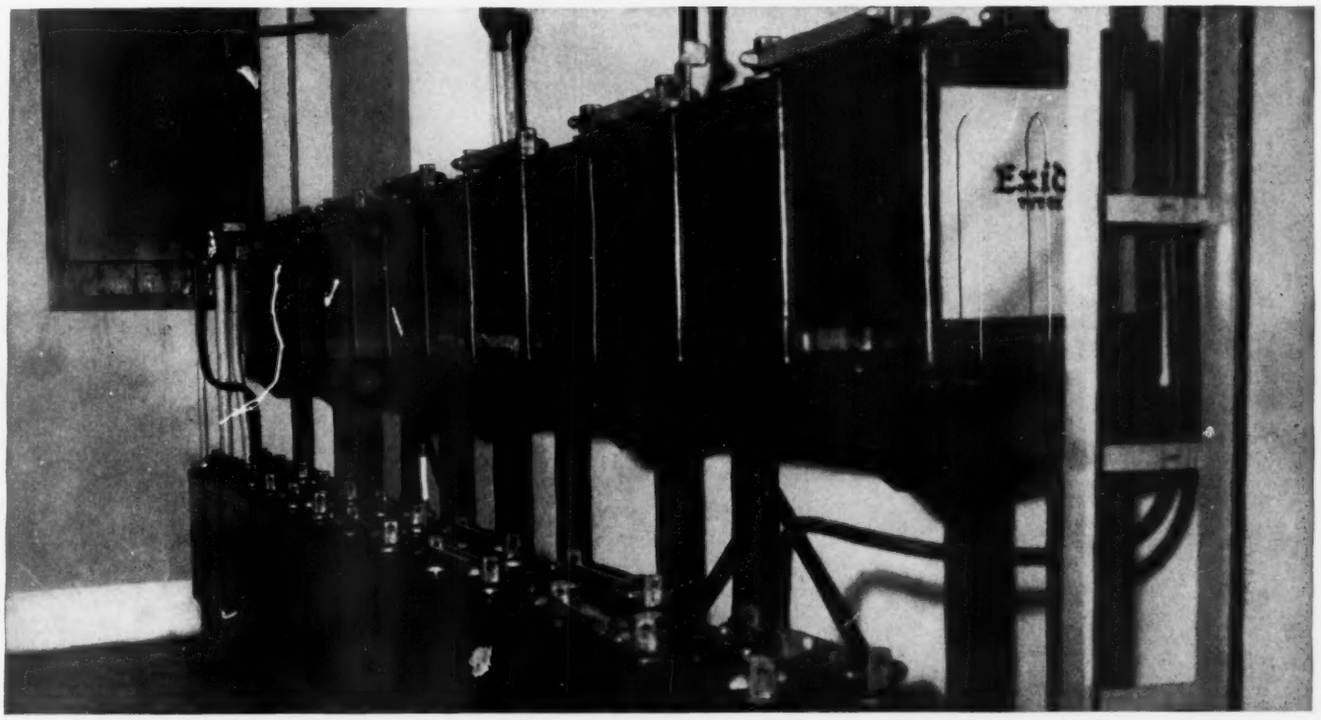

A TYPICAL INSTALLATION of Exide-Tytex batteries at the Stephenville, Tex., Exchange of the Gulf States Telephone Company. Used is a 26 cell type EOE-29 battery, mounted on a 2-step rack. Exide telephone batteries give a dependable source of power . . . assuring positive operation of equipment. They maintain an adequate reserve of power for emergencies beyond normal needs. Also, their compact design puts more power in less floor space. For new installations, or to modernize existing facilities, plan now on using Exide telephone batteries!

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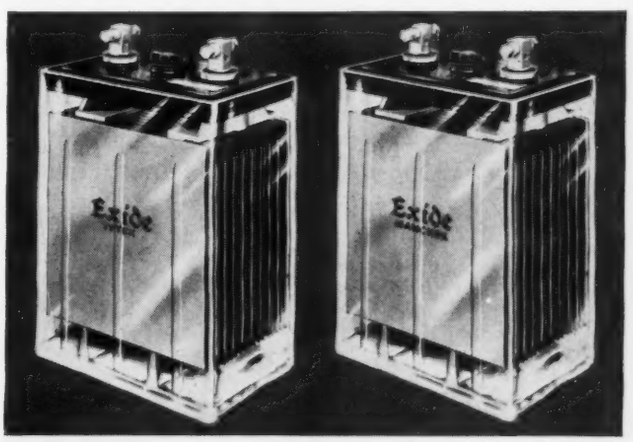

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A

Telephone Engineer

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TELEPHONE and Management ENGINEER

NOVEMBER 1954
Vol. 58 No. 11

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FRONT COVER

Members of the Board of Directors of the Rocky Mountain Telephone Association. Seated (l. to r.): — T. Clark Callister, C. W. Haas, Ward Blazzard, Dick Baker, C. M. Hart, Randy Manuel, D. A. McLean, and J. L. "Dusty" Kemper. Standing (l. to r.): — J. F. Thiele, M. O. Trego, R. H. Priest, Earle Crandall, J. F. Monsen, Floyd L. Reyher, J. W. Corbin, and Rulon Callister.

The National Telephone Magazine

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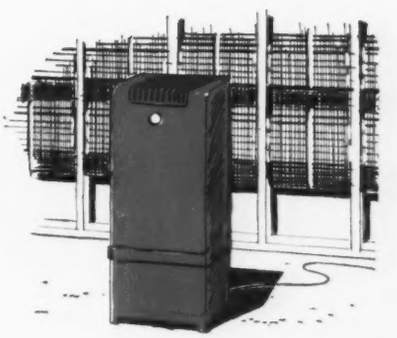
GraybaR TELEPHONE NEWS

SILENCING A NOISY NEIGHBOR

The increasing noise induced into open wire side and phantom circuits by parallel power lines can be effectively muffled by the Graybar-distributed Speco SNS Noise Suppressor. In many instances, you don't have to resort to costly loading and retransposition methods. One SNS Suppressor at each end of the circuit changes the relationship between noise and voice so that noise is no longer objectionable. Result: more circuits working for you . . . more satisfied customers . . . and more toll revenue.

SMOOTHS OUT A JANGLE

The USI Multi-Frequency Ringer changes a party line telephone's ring from a jarring jangle to a smooth, pleasing jingle. Vertical mounting of the gong assembly, a unique clapper, and a separate resonant weight are the secrets. Designed to the same high standards, this USI ringer was developed as a companion piece to the new Western Electric No. 591 telephone set into which it fits without modification. High impedance of ringer permits bridging up to 10 phones on a party line circuit.



ON GUARD AGAINST HUMIDITY AT REMOTE DIAL OFFICES

Use these compact electric dehumidifiers for protection of costly and vital rust-susceptible equipment in unattended rural dial offices. They efficiently "squeeze" moisture from the air, keeping humidity below the danger level. For prices and specifications on this and any other telephone need, call your local Graybar Representative—he will be glad to assist you.

405-2211

HOW HIGH IS IT?

A lineman can determine the height of a power or telephone line in a few seconds with the Meyer FRF-2 Field Rangefinder. Available via Graybar, the FRF-2 has a special inverting prism so that the operator needn't tilt his head back to make vertical measurements. It's accurate to within 2 per cent over ranges from 8 to 100 feet.

Call Graybar first for...

GRAYBAR ELECTRIC CO., INC.
Executive Offices:
Graybar Building, New York 17, N. Y.
IN OVER 110 PRINCIPAL CITIES

Now... in 8

8

modern colors

in combination with black
to harmonize with today's
decorating schemes

YELLOW
IVORY
BROWN
GREY
BEIGE
BLUE
GREEN
RED

... the famous KELLOGG K-500 Telephone

modern, decorator COLORS!

Here's good news for you... and your "color-conscious" customers!

Kellogg has invaded the field of home decorating!

Yes, now you can offer your customers the famous K-500 telephone in eight two-tone colors in addition to the standard black phone. Fresh, modern shades of red, ivory, yellow, brown, grey, beige, blue and green, in combination with a sparkling black handset and dial. A symphony of colors that will match or contrast, and certainly complement, any decor.

This will be welcome news to your customers, for never before have they been so conscious of good design and smart coloring. They are demanding fashionable colors for their homes... from the smallest utensil to the most important furnishing... necessities as well as luxuries. And now *you* can bring color to their telephone!

Color will mean extra profit on every installation. Color will also sell more extension phones! And the good-will that will result from offering your customers something really new and exciting will be invaluable.

Make sure you ask your Kellogg representative to show you samples of the eight new colors. He'll also tell you about our recent "color-preference" survey that will aid you in ordering your colored K-500's.

Two-tone telephones to match or contrast any household decor...

KELLOGG DIVISION OF IT&T

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A Division of International Telephone and Telegraph Corporation

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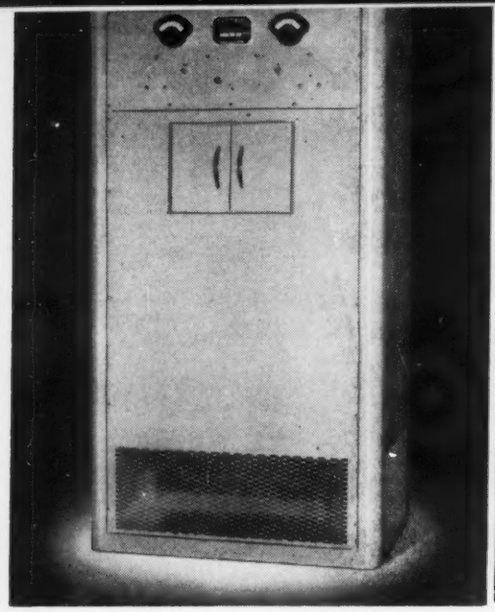
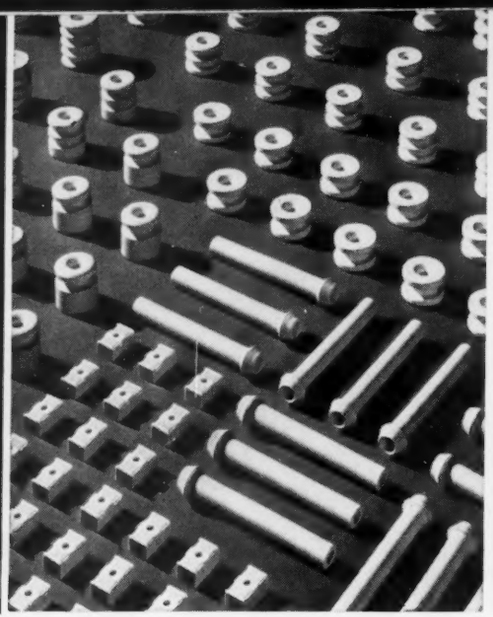


Automatic Constant Voltage Battery Charger! By adding the proper 3-phase FLOTROL to your exchange you can maintain full-floating operation, cut down running time on your rotary equipment, and save on your power bill. LORAIN PRODUCTS CORP.



Uniform High Quality is the distinctive characteristic of all PORCELAIN PRODUCTS, INC., insulators and wire holders . . . all carefully produced to exacting specifications and guaranteed to give top quality in insulation.

These Double-Faced Signs are made of long-life porcelain enamel fused to heavy gauge steel. Clear visibility and permanent colors are features of signs made by INGRAM-RICHARDSON MANUFACTURING CO. With either plain or activated surface.

Powerful Yet Lightweight — The #1W Tree Trimmer has double leverage due to the pulley which is attached to curved lever. Will sever any branch up to 1¼" diameter. Special coil returns blade to full cutting position. Made by BARTLETT MFG. CO.

Time Proven—for 60 years Exide Batteries have been serving telephony! The Manchester positive plate with its button type construction provides long life . . use Exide Manchex for all your battery requirements. ELECTRIC STORAGE BATTERY CO.

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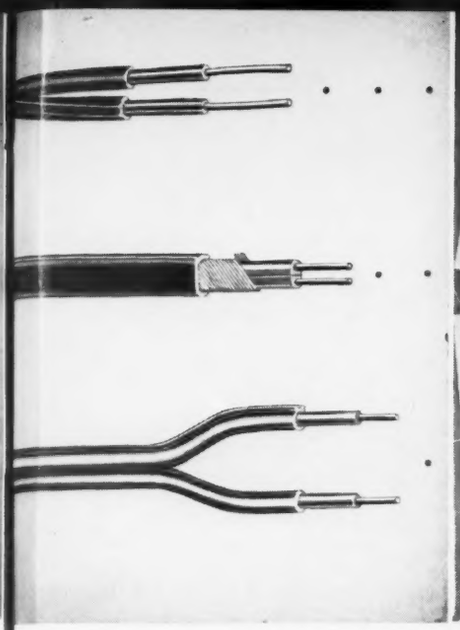
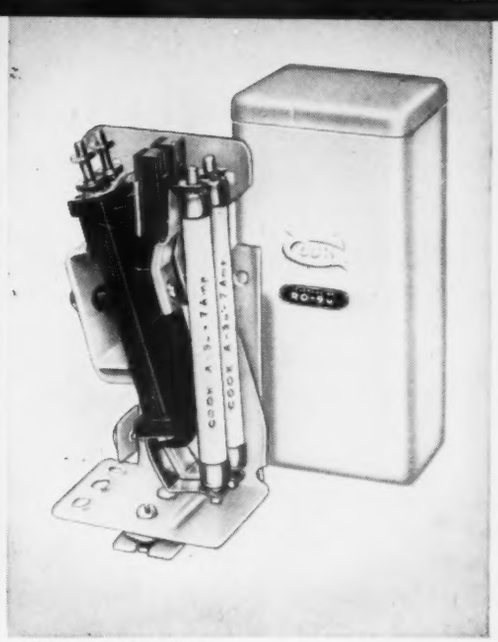


raid of Winter? Keep your lines in action... our maintenance costs down, with DIA-MOND WIRE & CABLE CO.'S RED-D Drop Wire. Superior adhesion, conductivity, ensile strength. Available in Copperweld nd Signal Bronze.

Long Life Expectancy is built into Southern Pine Poles and Crossarms. Carefully and thoroughly treated by AMERICAN CREOSOTE WORKS, INC., these poles have the extra durability required for dependable service under toughest climatic conditions.



Unusually Durable! Type R0-9u Sub-Station Protector Mounting with the H-20 Protector unit is very durable. Bakelite in Type H Mount gives this protector high resistance to breakage caused by severe electrical discharges. COOK ELECTRIC COMPANY.

KELLOGG

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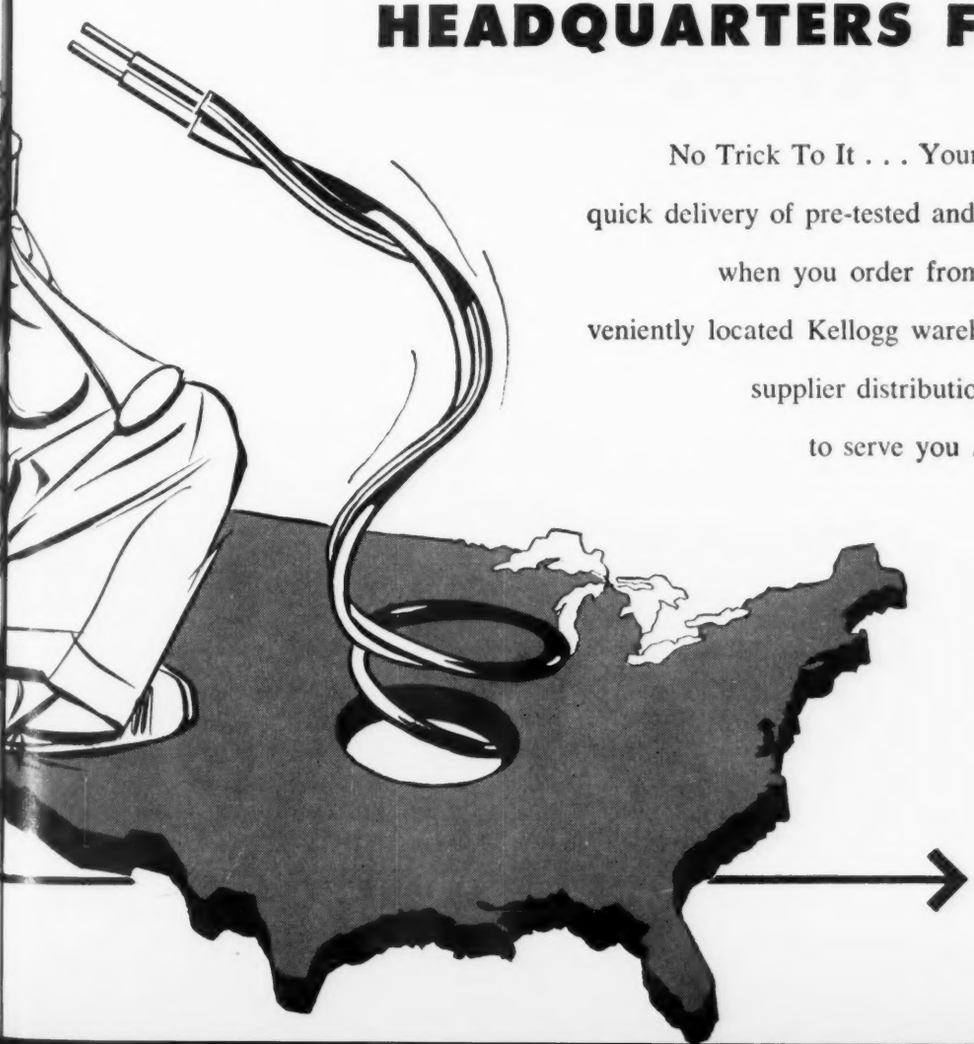

No Trick To It . . . Your order gets instant action . . . brings quick delivery of pre-tested and guaranteed Line Supplies when you order from Kellogg. Six well-stocked, conveniently located Kellogg warehouses and more than 100 supplier distribution depots are ready to serve you . . . today.

KELLOGG BRANCH WAREHOUSES AND OFFICES:

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1663 Mission Street
San Francisco 3, California
Market 1-6011

410 N. Syndicate Avenue
"Midway Area"
St. Paul, Minnesota
Nestor 5878

1555 West Fourth Street
Mansfield, Ohio
Mansfield 7-2516

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Vandyke 6759

720 S. Washington Street
Portland 5, Oregon
Atwater 8559

157 Chambers Street
New York 7, New York
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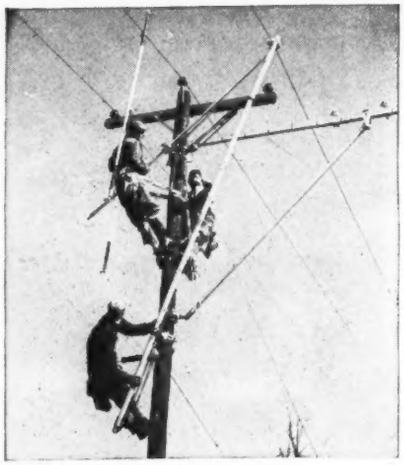
SAFE ON THE JOB

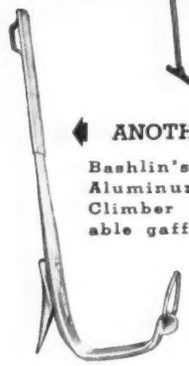


BASHLIN EQUIPPED!

Using

HOT LINE TOOL FACTORY DEMONSTRATORS

Men who think first of safety and efficiency on the job — use Bashlin Equipment.



ANOTHER FIRST

Bashlin's ALCOA alloy Aluminun Adjustable Climber with Removable gaff.

Self-locking screws assemble precision machined parts.

Write Today for Catalog No. 50

W.M. BASHLIN COMPANY

GROVE CITY 1, PA.

—mostly about people

Across The Editor's Desk

W. L. Escavaille Dies

W. L. ESCAVAILLE, 75, father of Mrs. Ray W. Smith, wife of the editor, died October 23, at a Wilmette, Ill., hospital following a lingering illness. Mr. Escavaille, until his retirement in 1940 was Public Relations Counsel for the Texas Gulf Sulphur Co., Houston. He was prominently interested in Texas politics for 40 years. Since 1947 he made his residence with the Ray W. Smiths in their home at Winnetka, Ill.

"Suggestion Box"

ONE OF OUR manufacturing friends was telling us his troubles during the past national convention here in Chicago. We found that everything was really alright and that he had few troubles that a few new orders would not cure. Just before we parted he told us his experience with a Suggestion Box he had put up for employes. About two weeks after it was installed he opened one of the suggestions that read "Take this thing down. I am not interested in going to a warmer climate or jumping in the lake."

Convention Visit

IT WAS NICE seeing *P. M. Ferguson* and his nice wife visiting the national U.S.I.T.A. convention again after an absence of several years. Mr. Ferguson is now president of the *Mankato (Minn.) Citizens Telephone Co.* and has held just about all the honors that could be bestowed upon any Independent telephone man. We did miss seeing his old side-kick and close friend *Tom Macoubrey* of St. Paul. This two-some has been attending the telephone meetings together for many years.

Nebraska Achievement

D. E. MCGREGOR, *Nebraska Central Telephone Co.*, Gibbon, Nebr. not only attended but was part of the program during the Plant Conference of U.S.I.T.A. We enjoyed visiting with the McGregors and had the opportunity of congratulating him upon his first dial conversion. Our Convention Report in the October TELEPHONE ENGINEER & MANAGEMENT gave his story in a condensed report. We heartily recommend those of you telephone men now planning a conversion project to get Mr. McGregor's story before you.

"Hurricane Hazel"

WE CONGRATULATE the city of *Myrtle Beach, S. Car.* and the *Lafayette Manor*, convention headquarters for the *South Carolina Telephone Association*, on surmounting of difficulties caused by *"Hurricane Hazel"* shortly before the meeting. Officers sent out notices the week following the storm that there would be no change in plan or place of the convention. We did not have the pleasure of attending this and the other conventions in the Southeast during October as family interests took us to the Southwest.

"Good Traffic Reading"

THANK YOU *Karl Shock* of the *Texas Telephone Co., Sherman, Tex.*, for your nice letter commending the articles appearing monthly in this magazine authored by *Miss Ruth Richards*. He informed us his company and all subscriber traffic employes are making a complete folder of all of Miss Richards' articles. To bring all of you up to date on future features prepared for publication in this magazine by Miss Richards we are pleased to tell you that starting soon we will present the start of a complete guide to modern day training of traffic employes and supervisors. In the series she will present the basic principles and training lesson outlines in simple practical terms. This, we feel sure, will please Reader *Shock!*

NEWSLETTER
TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*
ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

Dear Sir: November 15, 1954

$3,602,000 REA LOAN GOES TO FLORIDA COMPANY: – Largest telephone loan on REA's books, $3,602,000 to North Florida Tel. Co., Live Oak, Fla., was approved recently by REA. Borrower is planning modern telephone system to serve 7278 subscribers, including 4096 now without service, over 1840 miles of line. Company will use its own funds plus REA loan money, to acquire from Florida Tel. Corp. 7 magneto, 1 common battery, & 2 dial exchanges, serving 3182 subscribers over 449 miles of line. Loan will be needed to improve & convert acquired facilities to full dial operation, add 1407 miles of new line, & integrate 332 miles of existing line into new system. About 100 miles of line will be rebuilt, & 3 dial central offices and other facilities will be added. There will be 13 dial offices with Live Oak exchange providing toll service for 6 other exchange areas. Service without toll charge will be available between some of offices.

Otto Wettstein III, for last 12 years pres. of Florida Tel. Corp., is pres. of new North Florida Tel. Co. Both he & his father, Otto Wettstein, Jr., are well-known in Independent telephone industry. Mr. Wettstein, Jr., who built a telephone exchange in Illinois in 1895 & later moved to Florida after building and acquiring 30 exchanges in Iowa & Nebr. will be board chairman of new company.

2nd loan of $595,000 to Crow Wing Cooperative Rural Tel. Co., Brainerd, Minn., also has been approved by REA. These funds, together with initial grant of $352,000, will be used to develop modern telephone system tc serve total of 1456 subscribers & 46 switchers in north central Minn. Funds will enable borrower to practically double operating area of system as originally planned. Crow Wing company is acquiring 5 Independent companies and 11 switcher companies now serving 527 subscribers on 257 miles of line. Borrower plans to rebuild about 230 miles of existing line & construct 432 miles of new line. Dial central offices are also to be established at 6 locations.

$223,000 loan has been approved for Utelwico, Inc., Talbotton, Ga., with the loan to be used to finance conversion of existing system, serving 245 subscribers over 42 miles of line, to dial operation & add facilities to serve 186 new subscribers.

S & T Tel. Cooperative Assn., Goodland, Kans., was granted $444,000 loan by REA to improve & extend telephone service in 4 Kansas counties & Kit Carson County, Colo. Newly-formed cooperative is planning acquisition of Levant Rawlins County Tel. Co., Kanorado Tel. Co., Kanorado & Farmers Tel. Assn., & Farmers Tel. Cooperative, all in Kansas, & Green Valley Tel. Assn., in Colo., whose facilities now provide magneto service to total of 398 subscribers & 112 switchers over 381 miles of line.

4th REA loan of $237,000 to Farmers Mutual Tel. Co., Madison, Minn., will be used to acquire Bellingham (Minn.) Tel. Co., serving 237 subscribers, convert it to dial operation, rebuild 92 miles of line & add

75 miles of new line. With its 4 loans totaling $475,000, company will provide service to 775 subscribers.
Guadalupe Valley Tel. Cooperative, Smithsons Valley, Tex., has been granted $76,000, 2nd loan. Using its own funds, co-op will acquire an Independent company, & with REA funds it will convert to dial operation, add 55 miles of new line & serve 35 additional families. With its total REA allocation of $678,000, co-op will serve more than 800 subscribers.

$65,000 third loan to Cream Valley Tel. Co., Hawkins, Wisc., brings total grants to this company to $265,000. With these funds, borrower will furnish service to 574 subscribers over 170 miles of line.

Yadkin Valley Tel. Membership Corp., Yadkinville, N. C., was granted $40,000 to finance acquisition & development of East Bend Tel. Co. Company has now received $1,685,000 in REA loans. It will serve 3319 subscribers & establish dial central offices at 5 locations.

NIMLO COMMITTEE CHAIRMAN URGES ACTION ON REVISED SEPARATIONS PLAN: – Recommendation that National Institute of Municipal Law Officers' Committee on Electric, Gas & Telephone Rates urge state regulatory authorities to adopt separations procedures of their own if a new overall plan is not agreed upon was made by James H. Lee, special assistant corporation counsel of Detroit, at NIMLO annual meeting recently. Mr. Lee, who has been active in opposing Michigan Bell Telephone Co. rate applications, heads committee.

He praised National Association of Railroad & Utilities Commissioners' efforts to obtain modification of Charleston separations plan to reduce interstate-intrastate rate disparities further, & said that in his opinion FCC "has been entirely too slow in approving necessary changes which will, without doubt, cause some adjustment to be made in interstate rates."

SALES & PURCHASES: – Southern Bell Tel. & Tel. Co. will purchase Mayport (Fla.) Tel Co. . . . Southwestern Bell Tel Co. purchased Haslet (Tex.) Tel. Co. . . . Universal Tel. Co., Jenkins, Ky., purchased Vince Grove (Ky.) Tel. Co.

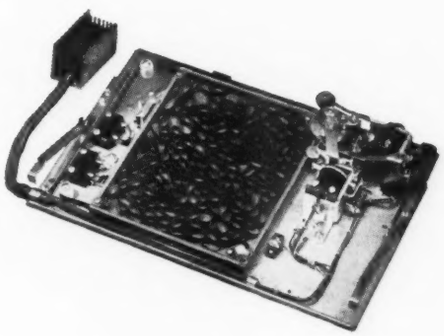
HIGHLIGHTS: – Edward E. Welsh, Greenville, Calif., received 1st of "Citizens Utilities – Joseph E. Briggs Memorial Scholarship" awards. Award is the 1st in annual program established by Citizens Utilities Co. as part of program of financial assistance to high school graduates . . . Penasco Valley Tel. Co-op, Mayhill, N. M., signed contracts covering $31,087 dial installation & $8,536 carrier project . . . General Tel. of S. W. will build $32,000 exchange building at Sulphur Springs, Texas.

HELPFUL LITERATURE: – Acker Drill Co., 725 W. Lackawanna St., Scranton, Pa., offers new bulletin describing its line of LD and LLD portable powered core drills . . . Markwell Mfg. Co., Inc., Dept. 77, 200 Hudson St., New York 13, N. Y., offers new literature describing the "Markwell Telephone Tacker." Literature shows how Markwell Tacker staples wire, fastens numerals to poles, & other jobs.

Ray Smith

Ray W. Smith, Editor

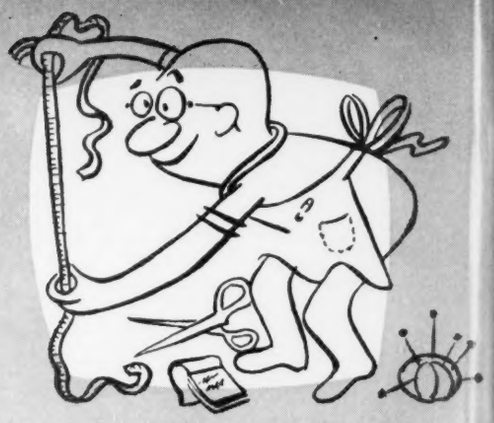
Facts you should know about the XY® Toll Ticketing Systems of Stromberg-Carlson



- The 2 types—"VID" and "LID"
- How they differ
- How to determine which is better for you
- Traffic advantages
- Revenue advantages

Complete details on the next 3 pages . . .

Take your choice of two types of XY® Toll Ticketing Systems



tailored to your specific problem of convenience and finance

The recording and computing of toll revenue are vitally important to every dial exchange. Selection, operation and maintenance of a toll ticketing system will have direct bearing on the over-all profits of your whole dial service.

In deciding which system will best serve your needs, you really need not look beyond Stromberg-Carlson. We have developed two systems, both of which possess these profit-wise advantages:

- Completely unattended operation, including the ability to transmit ticketing information from any remote point, over pole lines, carrier channels or microwave.
- Automation in playback function, whereby toll trunks are available for subscriber use the absolute maximum of time.
- The greatest ease of maintenance of any system available.

Stromberg-Carlson's two XY Toll Ticketing Systems match your service. For straightforward *local* area coverage, a Verifying-Identifying type, called "VID." For extended area coverage, a Line-Identifying System, known as "LID." Here, in brief, are their methods of functioning—based on toll calls made by hypothetical subscriber station BA3-4315 calling distant station LO4-7265.

THE VID SYSTEM

In placing a toll call over the VID System, the subscriber dials first an "access digit," then BA3-4315 (his own subscriber number) and finally LO4-7265 (the desired number). As he dials, his own number is verified and, if verified, subsequent pulses are passed to establish connection. In some installations the access digit may not be required.

THE LID SYSTEM

Here the subscriber dials only a single digit ("5") to indicate his station designation on a party line and then, of course, LO4-7265, the desired number. After the called party answers, an identifying process yields the directory number of the calling party. In some systems, an access digit may also be required as the first digit to be dialed.

So much for determining which TYPE system fits your requirements. Now let's examine some of the other advantages inherent in the famous XY Toll Ticketing Systems.

Continued on opposite page . . .

The exclusive advantages of the XY® Toll Ticketing Systems are all "Money in Your Pocket"

XY Toll Ticketing, as part of a dial office, contributes to the over-all profitability of service. And the substitution of automation for manual methods of ticketing is economy in itself.

But even more economy is possible. Consider, then, several Stromberg-Carlson advantages over and above the obvious savings inherent in mere automatic operation.

Consider XY's completely unattended feature . . .

XY Toll Ticketing is automatic not only in its recording function—but also in every step thereafter. Information may be transmitted any time, from any place where electrical current exists. We provide automatic "watching" over traffic and automatic "clearing" of recording equipment as capacity is reached. And XY Toll Ticketing recorders may play their information back to typewriters or to card-punching machines, so that *human* operation is restricted to no more than the final processing of bills!

Consider the matter of trunk holding time . . .

The actual trunk circuits over which the subscriber talks record their information on *individual* equipment—a magnetic tape recorder. When a call is completed, the trunk is instantly available for another call. In busy periods, this can be of utmost importance—because a toll circuit "held up" until it delivers its information is a circuit *out of use*. Cumulatively, this could add up to an appreciable loss of revenue—but not if you're using XY!

Consider the XY playback speed . . .

One single set of XY Toll Ticketing common equipment has the capacity of handling easily 10,000 tickets a day. Normally, transcribing is set to initiate automatically at a time when trunk traffic is low. The process, however, will be started *immediately* whenever desired—and the records of 100 completed calls will be transcribed in not over 12 minutes. Again—less holding time means more revenue.

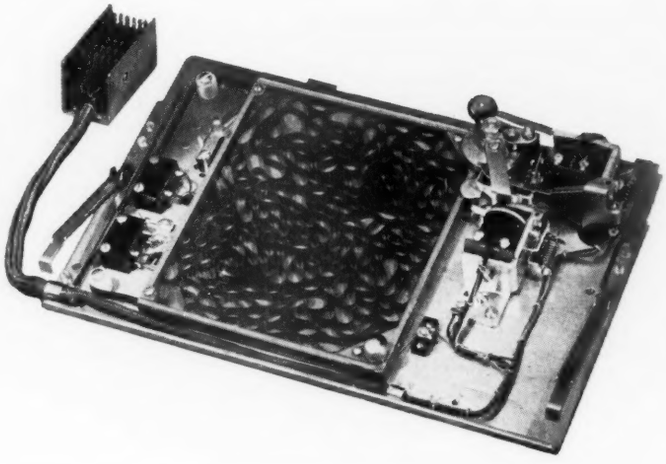
Consider electronic design . . .

Stromberg-Carlson, in designing the XY Toll Ticketing System, has used the electronic technique so successfully developed for modern computing machines. Advantages show up both in original cost and in the amazing flexibility of the system's applications. And *maintenance* is greatly simplified.

On the next page, components of the system . . .

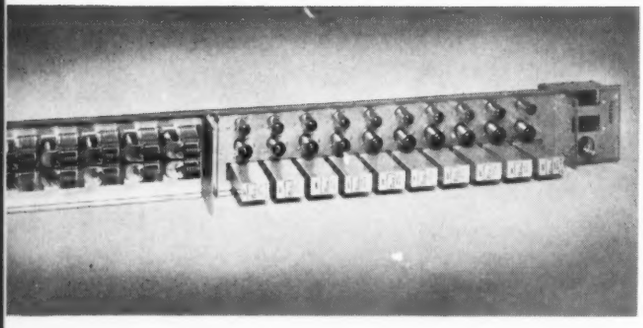
These are the components of the XY® Toll Ticketing System

Capacity: 10,000 tickets a day—easily!



XY Trunk Recorder

Based on the design of the famous XY switch. Uses approximately 35 feet of ¼″ magnetic tape in an endless loop. Erased and re-used for an unlimited time. Capacity, up to 100 calls, making its magnetic impressions in a space of two-thousandths of an inch!



XY Identifier Circuit and Clock-Calendar

The identifier circuit determines and records the several digits of the calling party's number. Its matrix has no moving parts—nothing to wear out. The Clock-Calendar transmits to the recorder impulses to indicate the date, time of day and conversation period.

Printing-Cutting Unit

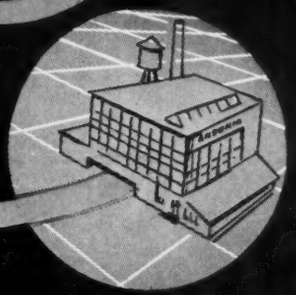
Similar to a standard rugged electric typewriter. Spool capacity, 10,000 tickets. The equipment prints, cuts and stacks tickets automatically.

Stromberg-Carlson®

ROCHESTER 3, NEW YORK

Branches: Atlanta 3, Chicago 6, Kansas City 8, San Francisco 3.
Manufacturing Branch, Dallas. Texas.

FIRST IN THE INDUSTRY



FIRST IN ENGINEERING AND KNOW HOW

FIRST AND ONLY SUPPLIER OF COMPLETE SPLICING INFORMATION & MATERIALS

Ankoseal Telephone Cables are sold to independent telephone companies through Ankoseal Telephone Supply Distributors only.

ANSONIA

Ankoseal®

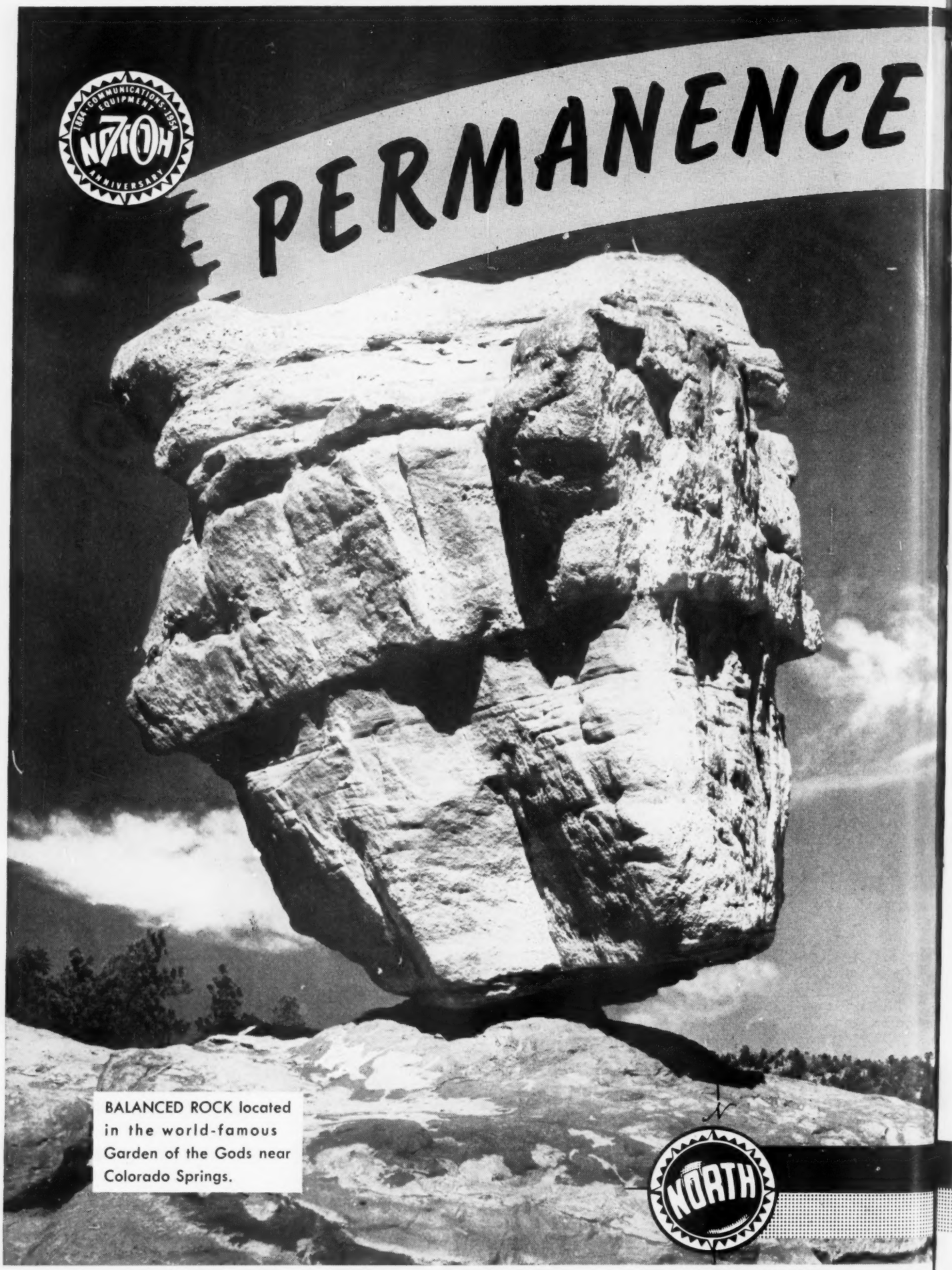
the quality all-plastic cable

It means something to you that "Ankoseal was first". That it was first to bring the industry the many advantages of plastic insulated cable. That it has been tried and tested longer than any other cable of this type. For confidence in the product may be judged by the experience of the manufacturer — in which case Ankoseal is first to be selected.

If you are not already using Ankoseal, make your next order the "first".

THE ANSONIA WIRE & CABLE COMPANY

ANSONIA, CONNECTICUT • PHONE: REGENT 4-3306


1884 COMMUNICATIONS EQUIPMENT 1954
NORTH
70TH ANNIVERSARY
PERMANENCE
BALANCED ROCK located in the world-famous Garden of the Gods near Colorado Springs.
N
NORTH

THRU BALANCE

Measured by the short string of man's years, this strange rock is regarded as a permanent wonder of nature. Massive precision of balance has kept it poised against the storms and stresses of centuries.

Profits in telephone business are similarly poised. Their base is extremely narrow in relation to the value of services sold. Facilities, representing investment, *must* be in balance with demands for service, which *can* represent income.

Companies watchful of this balance are permanently profitable. Others become mere business statistics.

Everything that North offers the Independent Industry is developed with this need in mind. Sound engineering of carefully selected improvements keep North equipment the best with which to balance investment in facilities against income from services. That is why North stands steadfastly for the relay principle of switching, free from mechanical wear, dependable, trouble-free and as expandable as the needs of any community.

Match your facilities to growing demands

Available in Canada through ERICSSON TELEPHONE SALES of CANADA, Ltd. 1410 Stanley Street Montreal 2, P.Q.

with NORTH All-Relay SYSTEMS

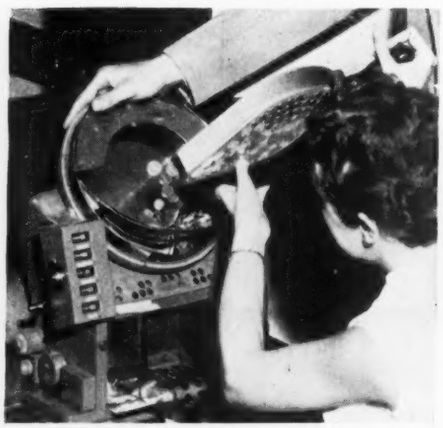
THE NORTH ELECTRIC MANUFACTURING COMPANY

601 South Market Street • Galion, Ohio

Proof-in-Pictures that Autelco Paystations pay right around the clock—outdoors:

This Outdoor Paystation pays $130 a month!

Paystations like it could be paying off for you. Act now!



Get helpful hints on developing paystation business, how to select equipment, full information on 5- and 10-cent paystations, conversion kits, accessories, booths, and signs —all arranged for easy ordering. Send for Catalog TT4078-B today!

Product of the Telephone Specialty Department of

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems

Makers of Telephone, Signaling and Communication Apparatus • Electrical Engineers, Designers and Consultants

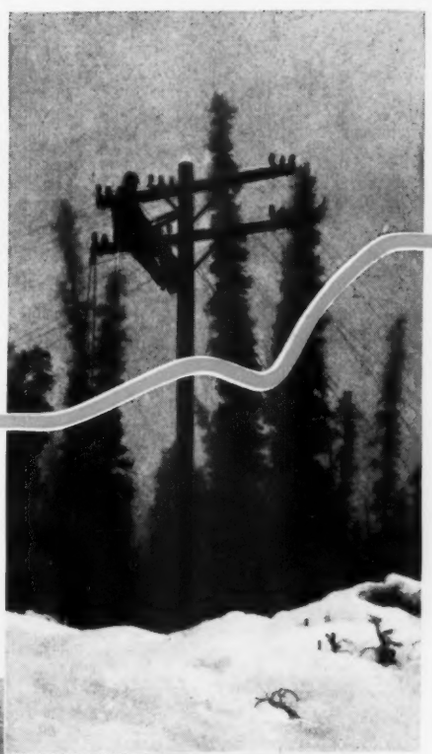
Distributors in U. S. and Possessions: AUTOMATIC ELECTRIC SALES CORPORATION
Export Distributors: International Automatic Electric Corporation
1033 West Van Buren Street, Chicago 7, U. S. A.

Another Link in the

Vital Telephone Network for Alaska--

—and again it's

Copperweld TRADE MARK **Line Wire**



The new 340-mile telephone line connecting Anchorage and Tok Junction, Alaska, represents an important addition to the Alaska Communications System—the long lines telephone network which is so vital to our national defense.

For this essential open wire carrier system, Copperweld* Telephone Line Wire was used. One of the factors which led to its selection was the outstanding performance of Copperweld on the 2,000 miles of pole line built along the Alaska Highway in 1943. It has proved its ability to take the terrific punishment of Arctic storms without service interruptions. Remember—Copperweld is the only conductor that combines the strength of steel with the conductivity and long life of copper.

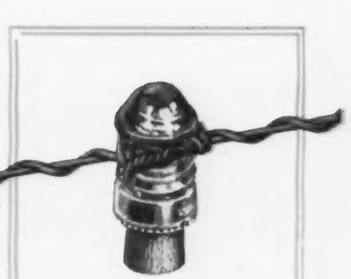
On millions of miles of overhead lines—all over the world—Copperweld Line Wire is providing dependable, trouble-free performance at lowest cost per year. Use Copperweld on all your installations—it will do the same for you.

*Trade Mark

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION
Glassport, Pa.
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

Copperweld TRADE MARK **STRONG, NON-RUSTING**

LINE WIRE



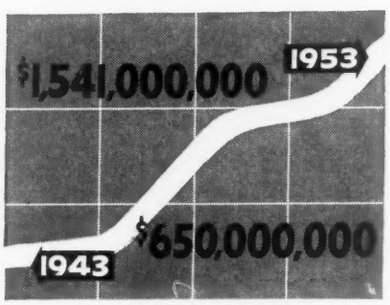
GRIP-FLEX INSULATOR TIES are used with Copperweld Line Wire on the Alaskan Telephone Network.

SOLD BY LEADING DISTRIBUTORS

The Only High-Strength Conductor Suitable For Carrier Systems

Now 1½ billion dollars strong—Independents continue record gains!

Ten years of expansion and improvement have doubled their investment in telephone service



GROSS PLANT INVESTMENT
of Independent Telephone Companies

Last year, the 5,100 Independent Telephone Companies serving the U.S., Hawaii, Puerto Rico and Alaska passed the billion-and-a-half mark in plant investment. In ten years, this thriving industry has doubled its size—and the years ahead promise even more. Why? Look at *decentralization.* Business is shifting plants, offices and personnel over wider and wider areas. Independent Telephone Companies are there—ready to provide the growing communications set-ups required. And look at *technical progress.* Such modern advances as long distance radio links and direct intercity dialing, both by operators and by customers, are multiplying telephone use. The growing Independent system of 9 million-plus telephones covers many of our nation's most active centers of development. Here it is that Independent Telephone Companies find the promise of the years ahead.

USITA

United States Independent Telephone Association

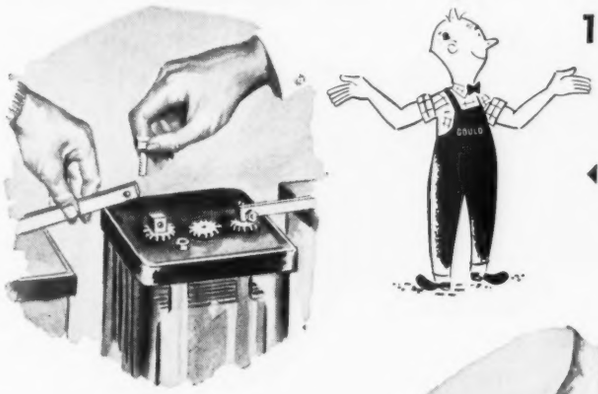
Pennsylvania Building: Washington, D.C.

BATTERY MAINTENANCE TIP #2

from the GOULD Plus-Performance Plan

BEST WAY TO REMOVE ELEMENT FROM JAR

When accidental damage requires installing an element in a new jar, the next step after removing the cell from the tray, is to pull the element from the jar. The Gould Plus-Performance Plan shows you how this can be done quickly in three easy steps.

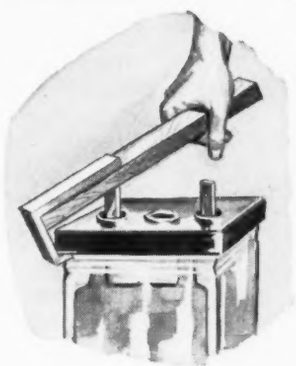


1. *Remove Cell*

Where not possible to remove cell and maintain the circuit by installing a connection jumping out the cell, use a 3 cell Automotive or small power battery and parallel with that section of main battery from which the cell is to be removed. Keep these parallel leads to the rear and out of the working area.

2. *Lift Element From Jar*

Remove seal nuts. Make an L shaped tool and remove cover using a wood board for lever. Lift element out of jar and install in new jar after placing compound on element supports. Neutralize acid on cover. Remove and replace old sealing compound. Install cover.

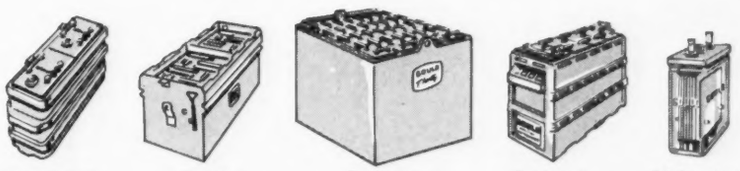


3. *To Replace a Cover*

Simply unscrew the lead alloy nuts from around each terminal post. This removes compression from acid-resistant, soft rubber post seals, allowing cover to be raised over the posts as in "2." It is always best to replace these rubber post seal grommets when installing new cover. Press new cover, filled with compound, into place, making sure grommets project above cover, and screw alloy nuts down tightly.

GOULD Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.



For Railroad Air Conditioning and Lighting | For Mine Shuttle Cars and Locomotives | For Electric Industrial Trucks | For Diesel Locomotive Starting | For Standby and Emergency Power

©1954 Gould-National Batteries, Inc.

Always Use Gould-National Automobile and Truck Batteries

This is only one example of the many helpful service tips contained in the Gould Plus-Performance Plan. For the complete set of published information on battery service and maintenance mail the coupon TODAY.

BATTERY INFORMATION HEADQUARTERS
Dept. TE-114 Trenton 7, N. J.

Please send me, without charge or obligation, the Gould Plus-Performance Plan for _____ batteries.
(type or types)

Name _____

Firm _____

Address _____

City _____ Zone _____ State _____

Every Type of Telephone Cable From One Source . . . *ISE!*

Whether it's cable to serve a few portable telephones, or to build a vast network of communications—you can look to ISE, associate of International Telephone and Telegraph Corporation, for every cable need.

This worldwide service provides telephone cable of all types, in every gauge and quantity—for aerial, duct, submarine, and subterranean installation. Local exchange cable, long-distance audio frequency cable, multi-conductor carrier frequency cable, coaxial cable, special cable for television or other uses—ISE provides them all!

Every type offered must conform to the highest possible standards. Rigid production-testing guards every foot made for uniformity of dielectric strength, insulation resistance, and mutual capacitance. And behind all this quality control stand the worldwide IT&T research facilities!

ISE has the longest continuous record of service to Latin America for its cable needs. What better assurance of our meeting your requirements!

FACTORIES IN SOUTH AMERICA: Cia. Standard Elec. Argentina, S. A. Ind. y Com., Buenos Aires, Argentina • Standard Electrica, S. A., Rio de Janeiro and São Paulo, Brazil • Cia. Standard Electric, S. A. C., Santiago, Chile

ISE — An IT&T Associate

International Standard Electric Corporation

WORLDWIDE EXPORT DISTRIBUTORS

Central telephone exchange equipment for installations of any size, automatic or manual.

Radio aids to air navigation . . . complete airport communications and lighting equipment.

Microwave communications systems and equipment for pipelines, utilities, railroads, telephony, aviation.

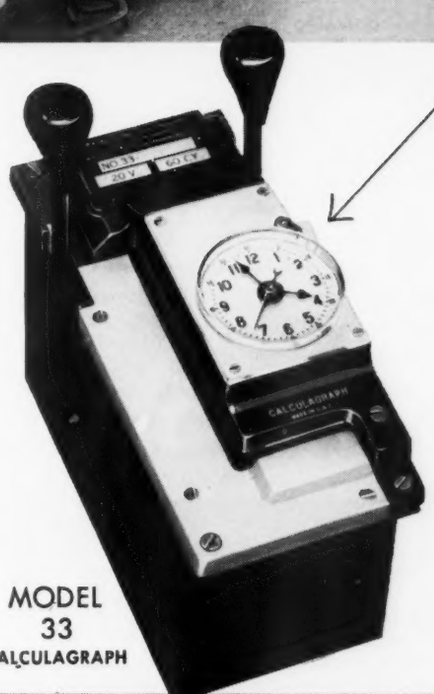
Teleprinters for automatic transmission and reception of written messages.

All equipment for television and radio broadcasting and receiving, point-to-point communication.

Here's why *modern* exchanges use

CALCULAGRAPH

Photo Courtesy of STROMBERG CARLSON CO. and THE PENINSULAR TELEPHONE CO.



MODEL
33
CALCULAGRAPH

Busy exchanges throughout the world are using Calculagraphs because they produce quick, accurate, automatic toll time records. Accurate to-the-second, printed records eliminate switchboard detail work and assure you of collection of all revenue due on every call. CALCULAGRAPHS are precision instruments with high visibility clock dials, easy to operate — featuring smooth silent lever action.

For complete information on the various models available write to —

CALCULAGRAPH COMPANY

HARRISON • NEW JERSEY

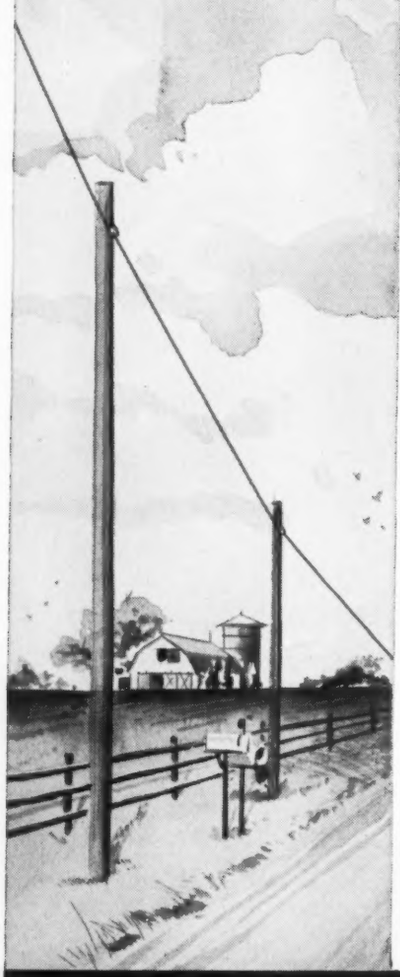
THE STANDARD OF ACCURACY SINCE 1892

NOW...

NEW SIX PAIR RURAL DISTRIBUTION CABLE

Polyethylene Insulated — Polyvinyl Chloride Jacketed Conductors

Completely Color Coded



EASY TO INSTALL

Light weight • Small size • Long lengths • Self-supporting • Full color coding

EXCELLENT ELECTRICAL CHARACTERISTICS

Low-loss transmission • Low capacitance • High dielectric strength

BUILT FOR LONG SERVICE

Polyethylene covered high strength steel core • Weather resistant • Electrically stable • Permanent, non-fading colors

This new six pair No. 19 AWG self-supporting rural distribution cable replaces six pairs of open wires for rural telephone distribution. Use of crossarms is unnecessary since cable can be attached to pole, making a neat, inconspicuous installation and reducing the amount of trimming required in wooded areas. On already crowded poles, capacity can be increased by six pairs by attaching this cable to the pole or the under side of an existing crossarm.

Also, excellent for use as multiple drop wire to small apartment and office buildings.

CONSTRUCTION

High conductivity No. 19 AWG annealed copper conductors. High dielectric strength, weather-resistant polyethylene insulation. Color-coded polyvinyl chloride Plastite® jacket over each insulated conductor to an outside diameter of .096". Adjacent pairs are twisted with varying lays to avoid crosstalk. Color coding of pairs is: black-blue, black-red, black-green, black-brown, black-slate, black-yellow. Pairs are twisted around a core of polyethylene-covered, high strength, galvanized steel in above order. Steel core has 1800 pounds breaking strength. Polyethylene covering provides cushioning effect. Approximate outside diameter of cable is .500". Available in long lengths to make possible extensive runs without splicing.

Order some Whitney Blake Six Pair Rural Distribution Cable today. You'll find its low initial cost, ease of installation and long service life will help reduce your outside plant maintenance cost. The public will like its inconspicuous, neat appearance.

Well Built Wires Since 1899

© 1954

WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT

Industry NEWS Briefs

This is your department. The editor wants news regarding your company. Send news items and photographs to News Briefs' Editor, 7720 N. Sheridan Road, Chicago 26, Illinois.

New Exchange Serves Chase City, Virginia

A BRAND NEW telephone exchange was placed in service recently in the town of Chase City in South Eastern Virginia.

Approximately 25 citizens and telephone officials were on hand to witness the simple ceremony as Mayor J. B. Geyer pulled the switch that officially placed the new exchange in service.

Although the conversion was from dial to dial, inauguration of the new exchange brought Chase City subscribers the 2-5 dialing plan, operator toll dialing and terminal-per-station facilities for urban subscribers. Cost of the new dial equipment, toll switchboard, the new brick central office building and outside plant was approximately $300,000. Officials of the Home Telephone & Telegraph Co. of Virginia say that the capacity of the new central office is about double that of the old exchange.

In addition to greatly extended central office facilities, the new exchange building provides adequate space for the commercial office as well as for other personnel.

For several months prior to the cut-over, publicity was released through various media to inform subscribers of the changes and improvements that would become effective with the cut-over through the new system. Particular emphasis was placed on informing subscribers of the 2-5 dialing plan and of its increasing importance to them as more and more offices throughout the country become part of the nationwide inter-toll dial network.

Plans call for an open house during the coming weeks so that the general public will have an opportunity to inspect the new exchange.

MAYOR J. B. GEYER of Chase City, Va., pulls switch that places new $300,000 2-5 exchange in service. This 2-5 conversion was the first made by Home Tel. & Tel. Co. of Va.

Home Telephone & Telegraph Co. of Virginia is an Independent company whose operating area is in 10 countries in South Eastern Virginia. It serves over 9,000 telephones through 18 dial exchanges.

Wade Named Pres. of Calif. Interstate Tel. Co.

THE ELECTION of Reid Gardner to the newly created position of chairman of the board and Willard Wade as president were announced last month by Philip W. Thompson, secretary of California Interstate Telephone Co.

Mr. Gardner has been president of California Interstate Telephone Co. since its organization on Jan. 21, 1954. He has resigned as president to accept the position of chairman of the board.

Mr. Wade has been executive vice president of the company and a member of the board of directors. He also was elected as a member of the Board's Executive Committee to serve with Mr. Gardner and Donald Royce.

Mr. Wade holds a degree in Business Administration from the University of Colorado. He started to work as a student in 1930 with the California Electric Power Co. From 1932 to 1936 he was district manager in Elsinore, Calif. In 1936, he was appointed general superintendent of the Interstate Telegraph Co., a subsidiary of the power company. He

was later appointed vice president and general manager, which position he held at the time the Interstate Telegraph Co. was sold to the California Interstate Telephone Co. in March of this year. He was then appointed executive vice president of the new company, the position he held until his appointment as president.

Mr. Wade was recently honored during the 35th Annual Convention of the California Independent Telephone Association when he was elected president of the Association.

"New Look" In Revenue Accounting at Illinois Central

ALL REVENUE Accounting operations at the general offices of the Illinois Central Telephone Co., Clinton, have taken on a "new look" since the recent completion of a "cut-over" to new and more efficient Revenue Accounting methods. Over several months the company has adopted a series of changes in methods of preparing toll and local exchange billings for 22,500 telephones. These changes included mechanization of bill and ticket handling which resulted in greatly improved efficiency and cost reduction of the company's Revenue Acounting functions.

One of the outstanding features of the new installation is the adoption of LeFebure toll ticket sorting equipment. This new method of sorting 140,000 tickets per month involved the installation of LeFebure ticket sorting trays which replaced the former standard ticket sorting racks and desk top sorting methods. As far as it can be determined, Illinois Central is among the first few telephone companies to have adopted the LeFebure plan. This system has proven to be a great time saver over the generally accepted rack sorting method previously used.

The company has also put into operation Recordak toll ticket microfilming equipment and is now sending to its subscribers each month, their original toll tickets instead of the former typed toll statement. A record of all tickets is maintained on microfilm at the company's Revenue Accounting center. Customer reaction to receipt of original toll ticket was extremely favorable and commercial time required to look up toll tickets, greatly reduced.

JOYCE LEGETT, chief toll billing clerk, Illinois Central Telephone Co., Clinton, Ill., (left) watches BARBARA REYNOLDS and CONNIE SPRAGUE sorting tickets with the LeFebure toll ticket sorting equipment. There are one or more sorting trays for each of the company's exchanges.

Other changes in the Revenue Accounting procedures included the installation of a standard National Cash Register utility billing machine and the change over to a six-cycle billing system, to even out the work load, in place of the former plan of billing all subscribers on a calendar month basis. A postage meter was also installed to expedite the dispatch of the large volume of mail.

Previous to the "new look" set up, about two-thirds of the company's toll billing was done at exchanges. All exchange bills were prepared at the company's Revenue Accounting center and sent to these exchanges for posting toll and mailing to subscribers.

The "new look" centralized the toll billing and bill mailing functions, together with the already centralized Revenue Accounting functions, completely, at considerable cost reduction in the field, with only a minor addition of employe hours in the Revenue Accounting office.

East Africa Company Takes TAI Services

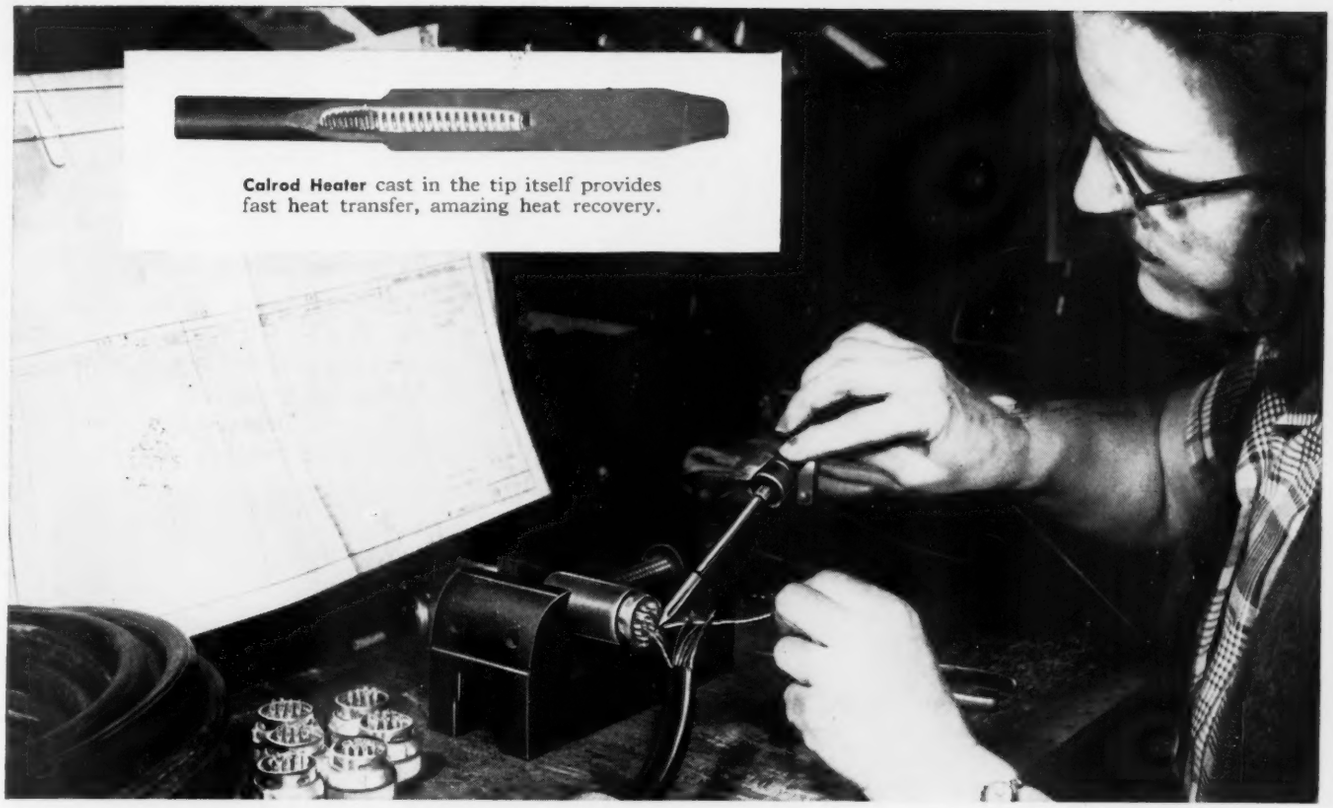
MEMBERS OF the U.S.I.T.A Advertising Committee, meeting with the Telephone Advertising Institute staff, in its summer session held in Chicago recently, were informed of an unusual new subscriber — from British East Africa. The new subscriber is the telephone company which serves the crown colonies of Kenya, Uganda and Tanganyika, and is a subsidiary service of the post office of British East Africa. There are approximately 20,000 telephones serving these areas which have a population of over 18,000,000. This means there is one telephone to about 900 people.

In a letter to Philip Rouda of the Telephone Advertising Institute, M. Warrender Richardson, Acting Post Master General of the colony, expressed needs for material which accurately parallel those of the privately owned American company. Mr. Richardson's advertising needs included material — for such examples as prompt payment of bills — giving the person you are calling plenty of time to answer — party line cooperation and the need of inspirational material to make telephone company employes feel that they are doing an important job.

In spite of the obvious differences in the corporate nature of the American private company, and this government subsidiary, Mr. Richardson felt Telephone Advertising Institute material was sufficiently accurate in its existing form to be used in his country.

C. B. Diplock Named to New Position

C. B. DIPLOCK, British Columbia Telephone Co. vice-president, has been appointed to the newly-created position of executive vice-president of the North-west Telephone Co. The new position has been created be-



Calrod Heater cast in the tip itself provides fast heat transfer, amazing heat recovery.

MIDGET'S SMALL-DIAMETER TIP with Calrod* heater cast in (see inset) is required here for close-quarter soldering. Fourteen delicate connections are soldered easily and quickly with the General Electric Midget iron. Three tip sizes are available.

Five Reasons why this Company is sold on the G-E Midget Soldering Iron

A. E. FINGERHUT, PLANT SUPT., PICKER X-RAY CORP., SAYS:
"We use General Electric soldering irons one-hundred percent. For close quarter soldering of electronic and x-ray components, we use the G-E Midget and we're completely sold on it."

1. "We're saving the replacement costs." Since switching to the G-E Midget five years ago, Picker X-Ray hasn't had a heating element burn out. That's because the Midget offers a long-life Calrod heater installed in the tip.

2. "We're saving maintenance time." Because the G-E Midget is equipped with a durable Ironclad tip, Picker X-Ray operators have eliminated tip filing. As a result, the company saves twenty to thirty minutes per day per operator in maintenance time. A Midget iron equipped with an Ironclad tip will give service up to *ten times longer* than irons equipped with ordinary tips.

3. "We're realizing increased production." Weighing only as much as a pack of cigarettes, the G-E Midget helps boost Picker X-Ray's production because operator fatigue is reduced.

4. "We're cutting damage costs." Small diameter tips, $\frac{1}{4}$ in., $\frac{1}{8}$ in., $\frac{3}{16}$ in. available with the Midget enable Picker X-Ray operators to solder small connections without burning adjacent wire insulation.

5. "We're getting the right amount of heat." Too much heat from a soldering iron causes varying quality in soldered components. Picker X-Ray finds that the G-E Midget produces the right amount of heat for soldering delicate connections.

Picker X-Ray's experience shows how you can profit by using the G-E Midget soldering iron for precision soldering. And to meet *any* of your soldering requirements, General Electric offers twenty-four different irons with ratings from 25 to 1250 watts. Contact your General Electric Sales Office today for more information. And for a free bulletin on industrial soldering irons, mail the coupon below.

*Reg. trade-mark of General Electric Co.

Sect. B720-139, General Electric Co., Schenectady 5, N. Y.
Please send me Bulletin GEA-4519D, Industrial Soldering Irons.

Name .....

Company .....

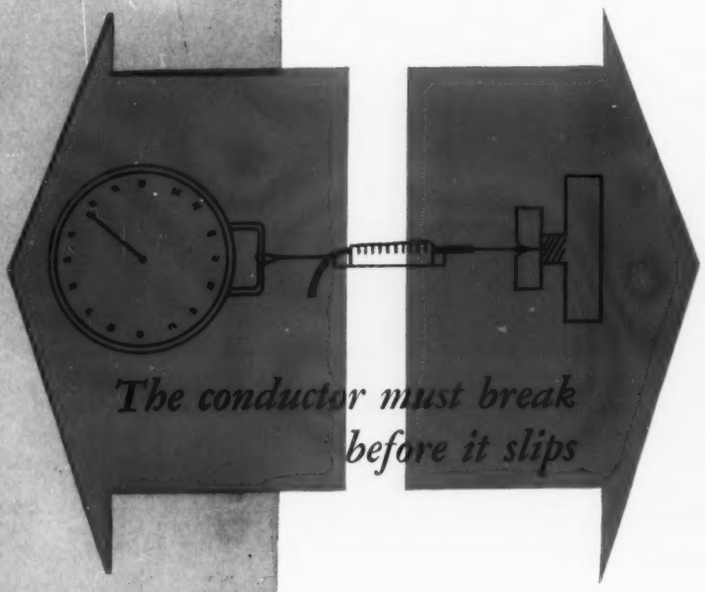
Address .....

City ..... **State** .....

GENERAL ELECTRIC

ALPHADUCT

P clamp adhesion test



P clamps are the most widely used method of attaching drop wire to buildings. Lest you may worry about a P clamp causing slipping of the insulation or jacket on Alphaduct Neoprene Jacketed Drop Wire — read about this Alphaduct service test. This test is made daily.

A sample of Alphaduct wire is inserted in a P clamp with 12 inches of the wire projecting from the top of the clamp. The bail of the clamp is then inserted in the upper jaws of a tensile testing machine, and the end of the wire is stripped free of jacket and insulation and inserted in the other end of the machine.

The jaws of the machine are then gradually separated until the conductor breaks. The conductor must break before there is ANY slipping of either the jacket or the insulation.

Don't have any worries about a little old P clamp hurting ALPHADUCT drop wire. Try Alphaduct. It's dated by a color coded thread so you can see for yourself how long it lasts, how much money it saves.

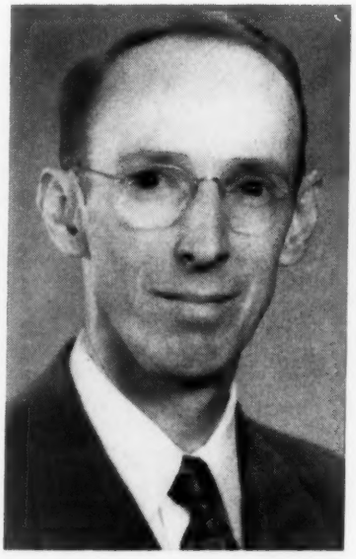
ALPHADUCT WIRE AND CABLE COMPANY • MILLTOWN, NEW JERSEY
NATIONAL DISTRIBUTORS • LEICH SALES CORPORATION, CHICAGO, ILLINOIS
REGIONAL DISTRIBUTORS • PANKEY SUPPLY CO., CHARLOTTESVILLE, VA.
THE LINDSAY TELEPHONE SUPPLY CO., CLEVELAND, OHIO

cause of the increased administrative responsibilities in the rapidly-expanding operations of the North-west Telephone Co. Mr. Diplock will continue in his capacity as a vice-president of the B. C. Telephone Co.

Gary Group Announces Personnel Changes

ANNOUNCEMENT has been made of the following transfers between companies of the Gary Group involving accounting personnel.

Byron A. James, auditor, Nebraska Continental Telephone Co., has been



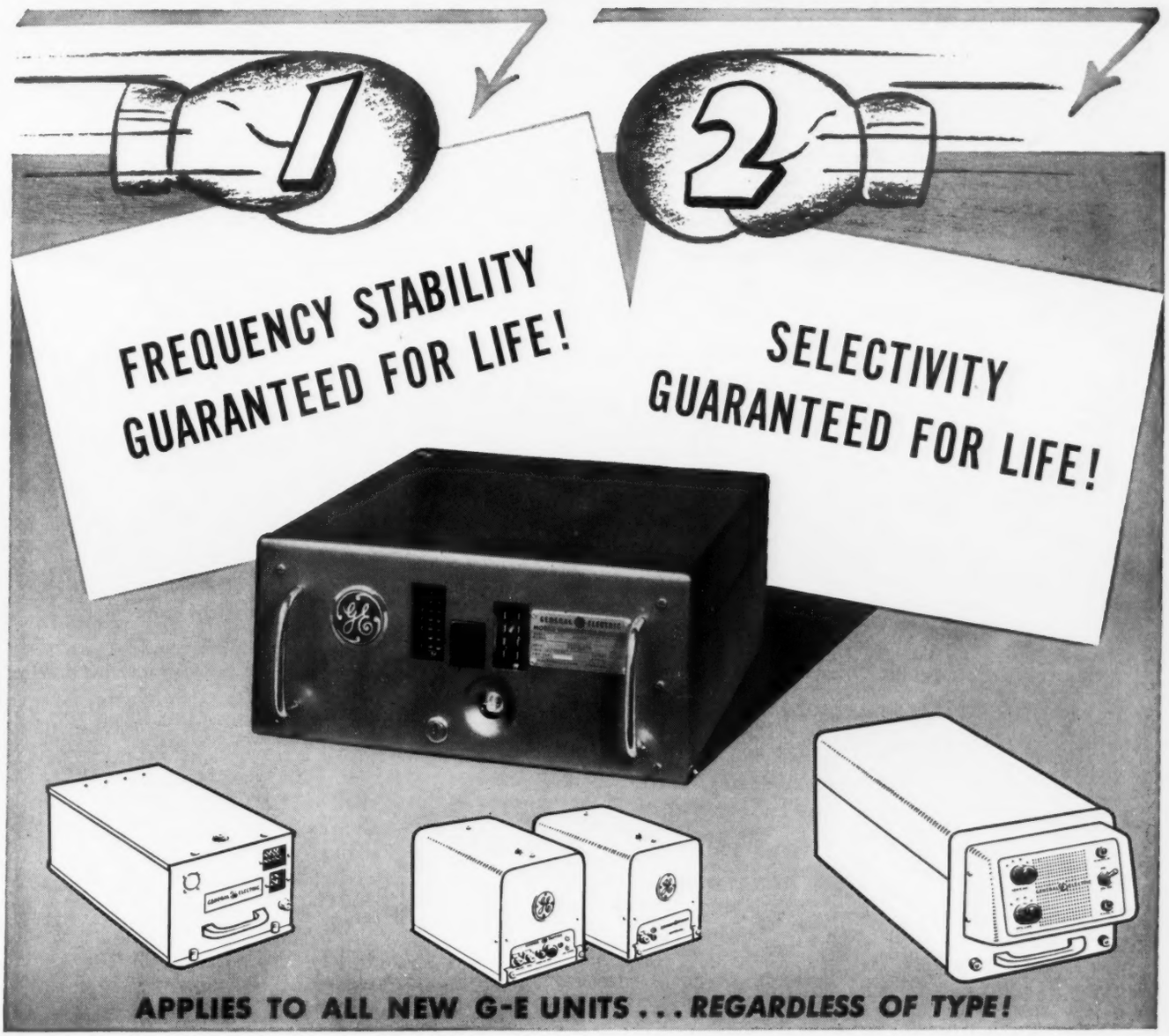
BYRON A. JAMES, accounting supervisor, Illinois Tel. Co., Bloomington.

transferred to Illinois Telephone Co., Bloomington, Ill., where he assumes the position of accounting supervisor.

Herman M. Waller, auditor, Georgia Continental Telephone Co.,

H. A. WALLER, auditor, Nebraska Continental Telephone Co., Columbus.

GIVE YOUR 2-WAY RADIO SYSTEM


1
2
FREQUENCY STABILITY GUARANTEED FOR LIFE!
SELECTIVITY GUARANTEED FOR LIFE!
APPLIES TO ALL NEW G-E UNITS . . . REGARDLESS OF TYPE!

2-WAY MOBILE RADIO

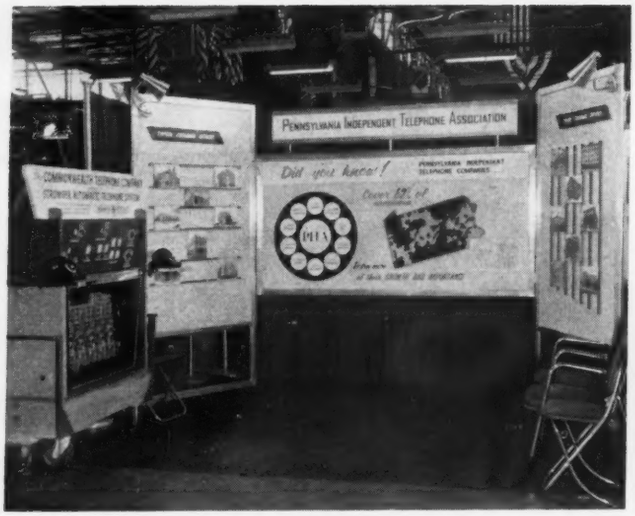
HERE . . . and *only from General Electric* . . . you have today's most potent influence on mobile radio design. G.E. guarantees protection from two major causes of unpredictable 2-way radio performance!

Guaranteed Selectivity with new multi-coil IF transformers guards your system against interference 24 hours a day! *Guaranteed Frequency Stability* clearly interprets the superior value of G-E crystals. Both, go the lifetime limit!

Printed space just can't tell the whole story. You'll want it firsthand, so pick up the phone now . . . call the G-E Communications Counselor at a local sales office. Or, write to: *Section X1974-12, General Electric Co., Electronics Park, Syracuse, N. Y.*

Progress Is Our Most Important Product

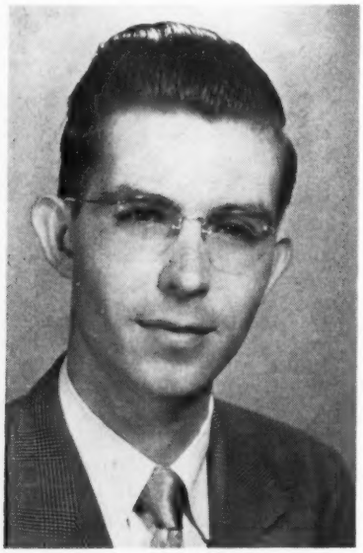
GENERAL ELECTRIC



PENNSYLVANIA EXHIBIT: — The above photographs show the exhibit of the Pennsylvania Independent Telephone Association at the first annual Pennsylvania Industrial & Construction Exposition held in Harrisburg during the week of September 20-25. About 250,000 people attended the exposition and many thousands visited the Association's booth. Photo on left shows the complete exhibit. The right photo shows EVELYN AY, Miss America of 1954, pointing out to Miss Pennsylvania of 1955 and A. C. HERBERT, exec. vice pres. of the Pennsylvania Association, her home town of Ephrata, Pa. which is served by the Denver & Ephrata Telephone Co.

assumes the position vacated by James and will be located at Columbus, Neb.

Morrison B. Haithcock, plant accounting supervisor, Durham Telephone Co., has been named auditor for Georgia Continental Telephone



M. B. HAITHCOCK, auditor, Georgia Continental Telephone Co., Monroe, Ga.

Co., Monroe, Ga. Mr. James has pursued a career in accounting beginning in 1926. He joined the Gary Group in 1946 when he became assistant auditor for the Ohio Consolidated.

Mr. Waller came into the Gary Group via the accounting division of the Community Telephone Co. of Wisconsin. He has been with the Group since 1947 and with Georgia Continental Tel. Co., since 1951.

Mr. Haithcock joined the accounting division of Durham Telephone Co., Durham, N. C., in August, 1947 and has continuously been employed by that company since that time.

J. O. Milligan, plant superintendent, Pennsylvania Community Telephone Co., has accepted a position as plant superintendent for the Middle States Utilities Co. of Missouri and the Andrew County Mutual Telephone Co. He will be located at Cameron, Mo.

General of S. W. Reports Rate Boosts

General Telephone Co. of the Southwest was granted two rate increases during the month of September. They are as follows:

Exchange	Effective	Old Rate	New Rate
Clarksville, Texas	October 16, 1954		
Common Battery	Bus.—1 Party	$8.50	$10.00
1,343 Stations	2 Party	6.75	8.00
	Res.—1 Party	4.25	5.00
	2 Party	3.50	4.00
	4 Party	2.75	3.25
Memphis, Texas	September 16, 1954		
Common Battery	Bus.—1 Party	7.75	9.50
	2 Party	6.25	8.00
	Res.—1 Party	4.50	5.50
	2 Party	3.75	4.50
	4 Party	3.00	3.50

At the end of September, General Telephone Co. of the Southwest had 26 cases representing an annual increase of $689,000 filed with cities in Texas and a case filed with the Arkansas Public Service Commission representing an annual increase of $302,000. This is a total of 27 cases on file, representing increases of $991,000 annually. For the first nine months of 1954, the company completed 35 rate cases totaling an annual increase in revenue of $359,000.

Oregon Independent Plans Expansion

The $186,000 rebuilding and improvement of telephone service in the Elkton-Scottburg, Ore., area is expected to begin by the end of the year.

C. J. Licklider, one of the incorporators of the new Umpqua Telephone Co., said that the outlay will bring dial telephones into the area, and between 200 and 300 more families will have service.

The area currently is covered by the Elkton (Ore.) Telephone Co., owned by Mr. and Mrs. Licklider.

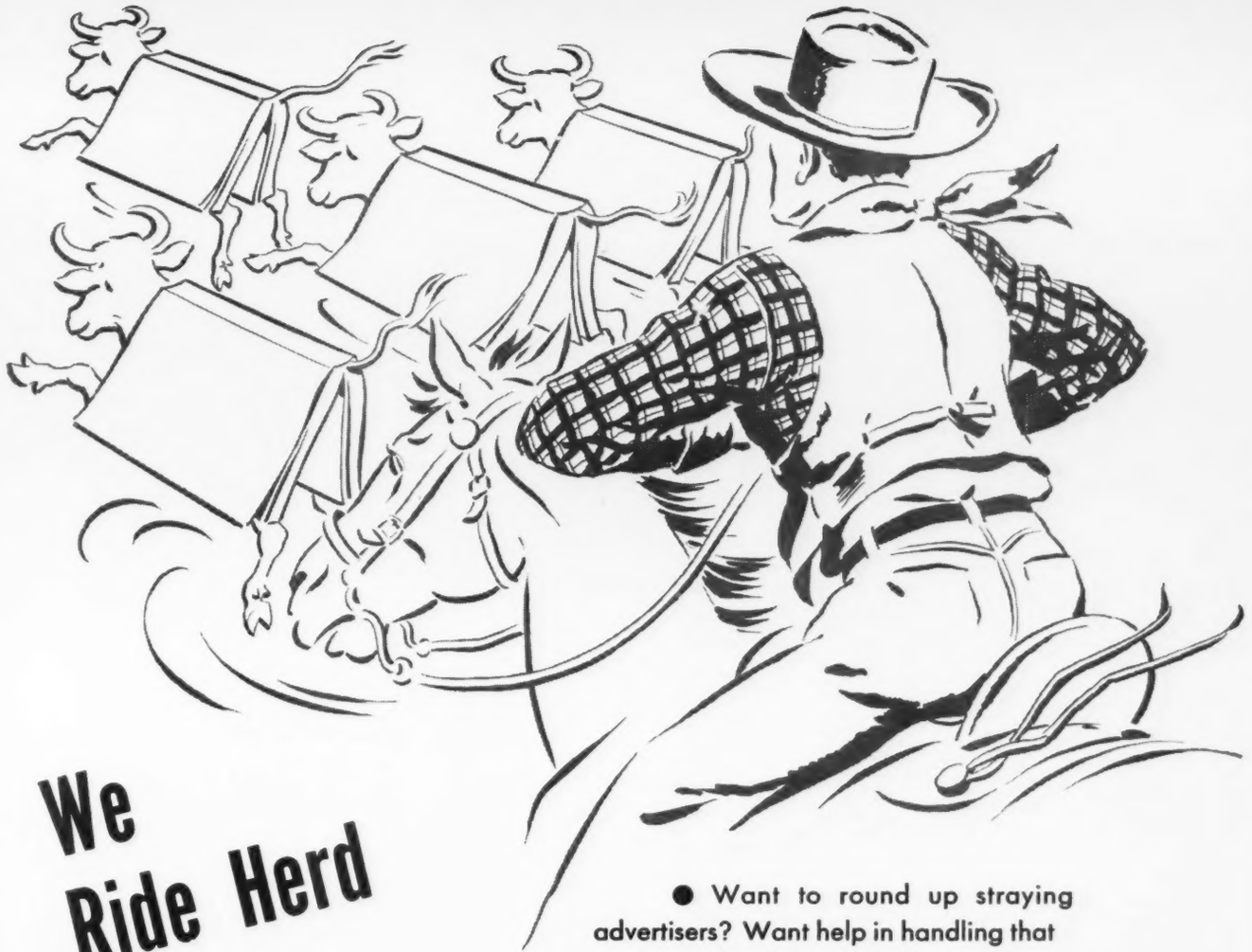
Licklider said dial offices will be installed in Elkton and at Wells Creek. Engineers are expected for survey work by the end of the month; construction will begin by the end of the year; and dial service is expected probably by summer.

The Elkton company now has about 188 subscribers, and by the time improvements are completed, the Umpqua company is expected to have between 400 and 500.

A. W. Ryder Joins Ohio Consolidated

Allan W. Ryder formerly vice-president and general manager of the Pennsylvania Community Telephone Co., Bangor, Pa., has accepted the position, effective as of Septem-

Please Turn To Page 36



We Ride Herd ON DIRECTORIES

● Want to round up straying advertisers? Want help in handling that growing pile of details? Want to clean up your directory generally? See an old hand at directory management who will show you a program of proven effectiveness for increasing revenue through directory advertising. You are invited to write or call Loomis today... without any obligation on your part.

KNOW-HOW TO SOLVE YOUR DIRECTORY PROBLEMS

"Where to Call"

● 666 cities and towns in 20 states are served by the 234 directories that retain Loomis services.

LOOMIS ADVERTISING COMPANY

FT. WAYNE, IND.
229 E. Berry St.... EAstbrook 3477

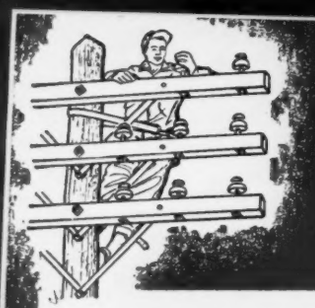
ST. LOUIS, MO.
506 Olive... GArfield 3700

OMAHA, NEBR.
Omaha Nat'l Bank Bldg.... ATlantic 0188

KANSAS CITY, MO.
810 Baltimore... HArrison 1270

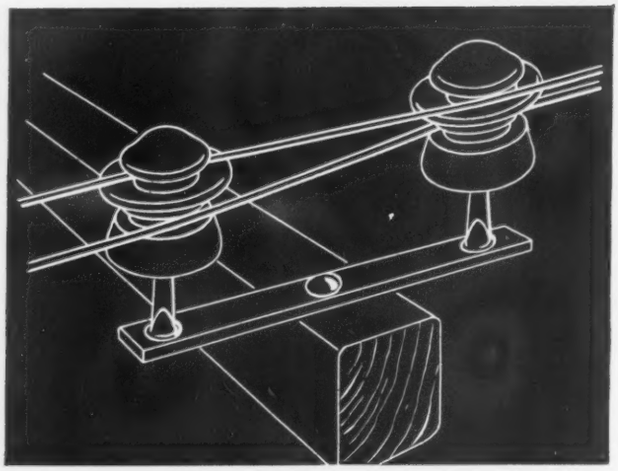
PHILADELPHIA, PA.
1201 Chestnut... Rittenhouse 6-4440

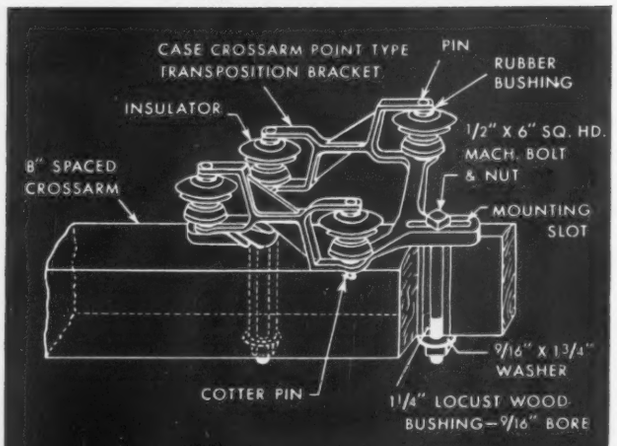
BALTIMORE, MD.
1229 North Charles... Vernon 7-0642



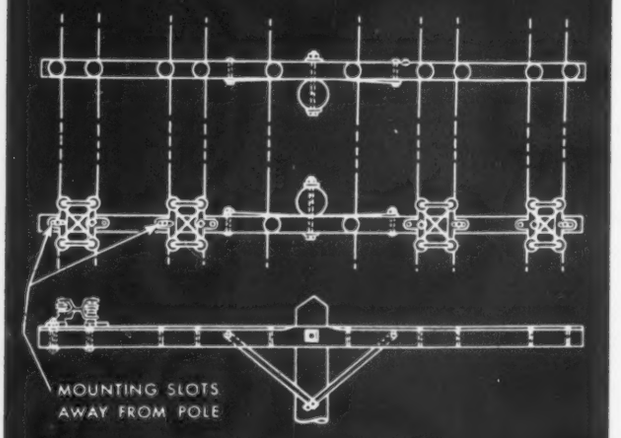
LINE CONSTRUCTION BLUEPRINTS

ITEMS SOME COMPANIES ARE USING TO MAKE LINE CONSTRUCTION WORK EASIER



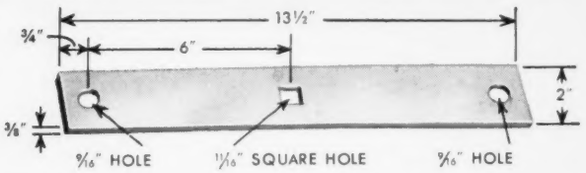


CROSSARM POINT TYPE INSTALLATION METHOD



TYPICAL INSTALLATION STRAIGHT LINE CONSTRUCTION

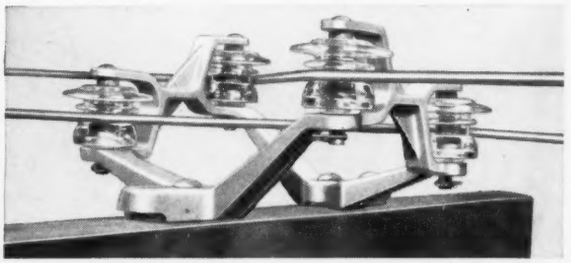
L-M TYPE "B" TANDEM TRANSPOSITION BRACKET



Used with transposition insulators for telephone line transpositions. Recommended for straight sections or at corners where pull is less than 15 feet. Heavy ⅜" x 2" steel, hot dip galvanized. REA-approved.

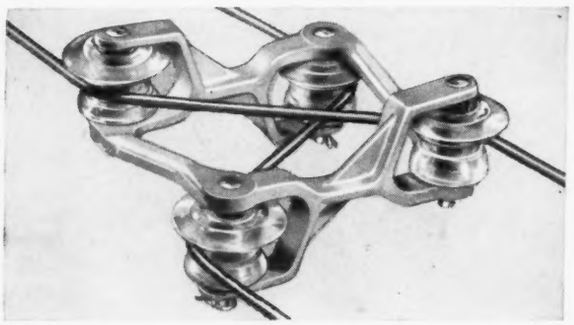
L-M CASE Roller Type TRANSPOSITION BRACKETS

Crossarm Point Type



Case Brackets equalize tension, balance lines, eliminate tie wires. Insulators *roll* easily as wire is tensioned—cutting installation time. Special rubber bushings set in insulators maintain continuity of service if insulators break. Available in crossarm and span point types, both of aluminum alloy. Weight—less than 4 pounds.

Span Point Type



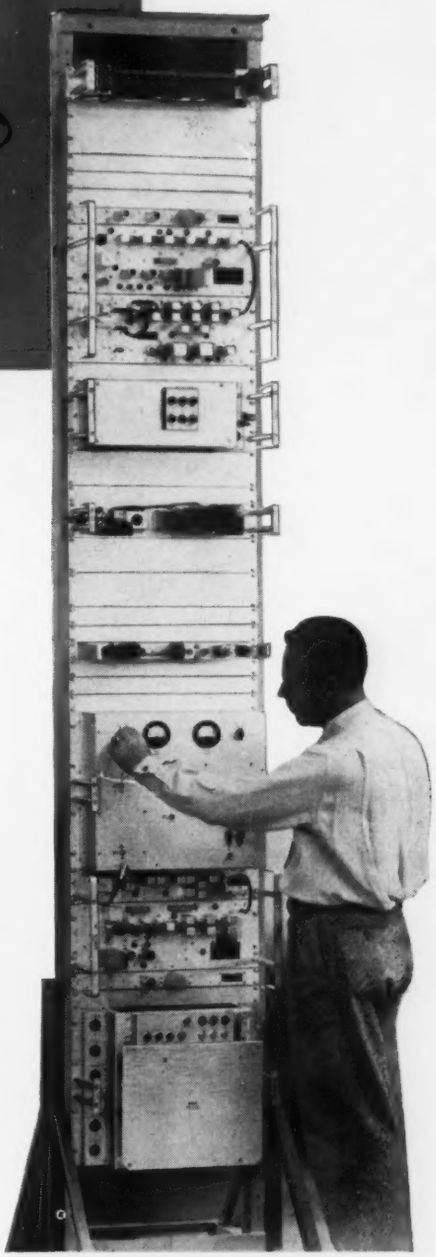
Do you have a line construction problem?

These are just a few of thousands of L-M line construction specialties. If you have a line construction problem, let us know. We may have standard or special items in stock that will solve it. Ask the North Electric or Kellogg representative or the L-M Field Engineer. Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).

LINE MATERIAL *Line Construction Materials*

119-R

Hesitant to try microwave?



Buy LENKURT MICROWAVE

Designed for Telephone Men

EASIER TO PUT IN — EASIER TO USE

EASIER TO ENGINEER: Routing is simpler because 900-mc frequency is less subject to reflection from water and salt flats, and is not materially affected by thunderheads, sleet, or snow in atmosphere. Application is simple; standard 2/4-wire terminations, standard transmission levels, ringdown or full duplex dial signaling used. Expansion is simple for equipment in "stackable" and provides maximum number of channels (73) in allotted spectrum.

EASIER TO INSTALL: Equipment mounts in telephone-type racks. Channelizing equipment may be installed in CO for convenience (since modulating frequencies can be transmitted by wire to radio site). Two pairs handle up to 24 conversations; there's no need to connect a pair per channel.

EASIER TO MAINTAIN: Automatic alarm system warns of trouble; remote testing locates it quickly. Straightforward design, clean-cut construction, and readily-accessible wiring enable men with minimum radio training to repair it easily. If channelzing equipment is located at CO, maintenance is particularly simple and low in cost.

Manufactured For

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems

Makers of Telephone, Signaling and Communication Apparatus • Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions AUTOMATIC ELECTRIC SALES CORPORATION
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USE AUTOMATIC'S SWITCHBOARD-TO-SWITCHBOARD ENGINEERING HELP

to insure success in your microwave toll plant program. Whatever your toll problems may be, Automatic Electric is prepared to engineer the best solution. Write us today.

AUTOMATIC ELECTRIC — LEADERS IN CARRIER COMMUNICATION — LENKURT

Give the GUY a CHANCE

Build lines to stay with the

CHANCE 8 Way

Here's a typical example of a test result . . . This 200 square inch Chance 8-Way was pulled to nearly double its rated load without damage to the anchor.

MIKE'S RIGHT! You can't tell what happens to an anchor after it's installed unless it fails—or is pulled out in a test or dug out for examination. Chance has pull-tested all kinds of anchors all over the country to see what happens when anchors are subjected to heavy loads. These tests prove that the Chance 8-Way holds far more than its rated load because the eight blades expand to form a complete pyramid shaped square—there is no wasted space between blades. The guy load is equally distributed all around the hole.

* * *

8-Ways are available in a range of sizes for every requirement from guying rural phone lines to guying heavy transmission lines. Your CHANCE Anchor Distributor can probably supply you directly from stock. SPECIFY CHANCE FOR SERVICE!

A·B·CHANCE CO·

CENTRALIA, MISSOURI

SAN FRANCISCO, CALIFORNIA

ABC INDUSTRIES

CA54-4A

Industry News

(Continued From Page 32)

ber 16, of general plant superintendent of the Ohio Consolidated Telephone Co. and will be located at the headquarters of the company in Portsmouth, Ohio. The Ohio Consolidated Telephone Co. is an affiliated company of the Gary Group of Independent telephone companies.

In his new position, Mr. Ryder will direct all plant operations for the Ohio Consolidated Telephone

ALLAN W. RIDER

Company which now serves over 50,000 stations. He is succeeding W. T. Reichel who is leaving the company to enter business for himself after a very successful career over a period of years in several of the companies of the Gary Group.

Mr. Ryder assumes his new responsibilities with a sound background of past experience in the telephone industry behind him. Following his graduation from the University of Illinois in 1935 he was employed for a time by the Illinois Power Co. and the Western Electric Co. before joining the Gary Group as commercial representative in Clinton, Ill.

Since 1938, excepting only a period of two years when he served as executive secretary of the New York State Telephone Association, Mr. Ryder has been progressively employed in management positions with Gary Group Companies concerned with the direction of activities in all phases of the telephone business. Companies with which he has been

"The next town? . . . Over the hill, across the bridge, under the railroad, and when you come to the next Amertel pole, you're almost there."

• Far, far away—that's where the next town is. That's where the next telephone pole is, too, because those poles are strung with Amertel 135 instead of ordinary BB wire.

High-strength Amertel 135 permits much longer spans . . . cuts the cost of pole installation and maintenance . . . saves many man-hours of labor per mile. As for transmission quality, Amertel 135 has low electrical resistance and far better voice transmission characteristics than the old steel wire.

Like more information? Just address the American Steel & Wire Division, Rockefeller Building, Cleveland 13, Ohio.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

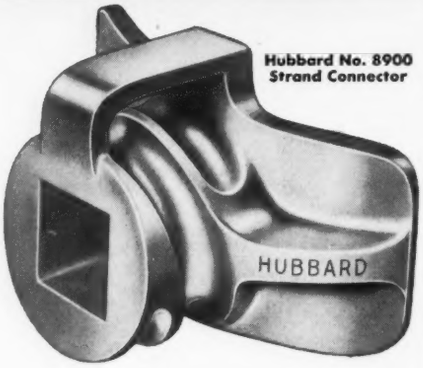
USS *Tiger Brand* AMERTEL

TELEPHONE & TELEGRAPH WIRE

UNITED STATES STEEL

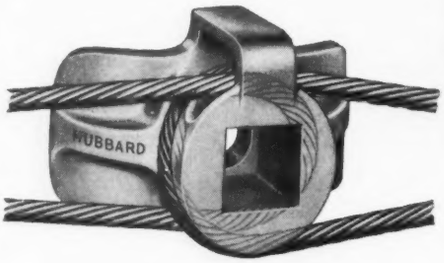
HUBBARD
STRAND CONNECTOR

The Hubbard No. 8900 Strand Connector was developed to provide a means for connecting the ends of telephone cable messengers at the pole, and is universally used by the largest telephone companies. It is used especially in connection with the installation of cable rings. It eliminates connecting messengers in the middle of the span and provides an efficient and safer means of support. Cable spinning equipment will not pass over the mid-span connections, therefore the No. 8900 is essential for all cable spinning installations.



Hubbard No. 8900 Strand Connector

Hot Galvanized



Phantom view showing how Messengers are installed on the Hubbard No. 8900 Strand Connector

"Hang the Load on Hubbard Hardware!"

OVERHEAD

Cable Suspension Material—Wireholders Pole Seats and Balconies—Clevises Braces—Drive Hooks—Messenger Dead Ends—Extension Arms—Long Span Material—Pins—Clamps—Guards—Stubbing Bands—Guy Protectors—Guy Clamps Pole Struts—Clips—Straps—Hangers Carriage Bolts—Rings—Transposition Brackets—Eye Bolts—Pole, Corner and House Brackets—Guy Hooks—Strain Plates—Storm Guy Straps—Lags—Machine and Hubeye Bolts—Sidewalk Guys REA Telephone Hardware

UNDERGROUND

Cable Racks—Manhole Ladders and Steps Pulling-in Irons—Expanding Anchors Cable Shields—Screw Steelwing Anchors Anchor Rods—Ground Rods and Clamps

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

associated, in addition to the Illinois Central Telephone Co. and the Pennsylvania Community Telephone Co., include the Blue Mountain, Southern and Wiconisco Telephone Companies of Pennsylvania and the Southern Continental Telephone Co. of Tennessee and Kentucky.

Michigan General Advances Benckert and Stoner

L. H. MEYER, president of General Telephone Co. of Michigan, has announced the appointment of K. W. Benckert as operating vice president

K. W. BENCKERT, operating vice president, General Telephone Co. of Mich., Muskegon.

to succeed Everett C. Roys, who died recently after a prolonged illness.

Edmund C. Stoner, a veteran of 28 years' experience in the telephone industry, has been appointed chief engineer of the Michigan company to succeed Mr. Benckert.

Mr. Stoner, a graduate of Yale University, was employed from 1926 until this year by various subsidiaries of International Telephone & Telegraph Co., with the execption of the period 1948-51, when he served as a

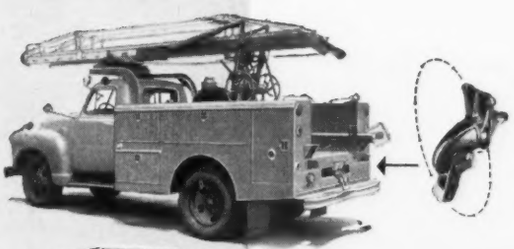
EDMUND C. STONER, chief engineer, General Telephone Co. of Mich., Muskegon.

POWERS American

Series 450 CONSTRUCTION AND OVERHEAD MAINTENANCE BODY

Does the Work of TWO TRUCKS

Ladder can be revolved 360° at elevations from 30° to 75°. In 23'6", 26'6", and 30'6" mechanical units, or 35' hydraulic model.



Body is 108" long, for installation on dual-rear wheel chassis having cab-to-axle dimension of approximately 60"

Here's a multi-purpose body that does work normally requiring two or more specially-equipped vehicles.

FOR OVERHEAD WORK . . . the body has a Powers-American mechanical or hydraulic Aerial Ladder, in a working height best suited to individual needs.

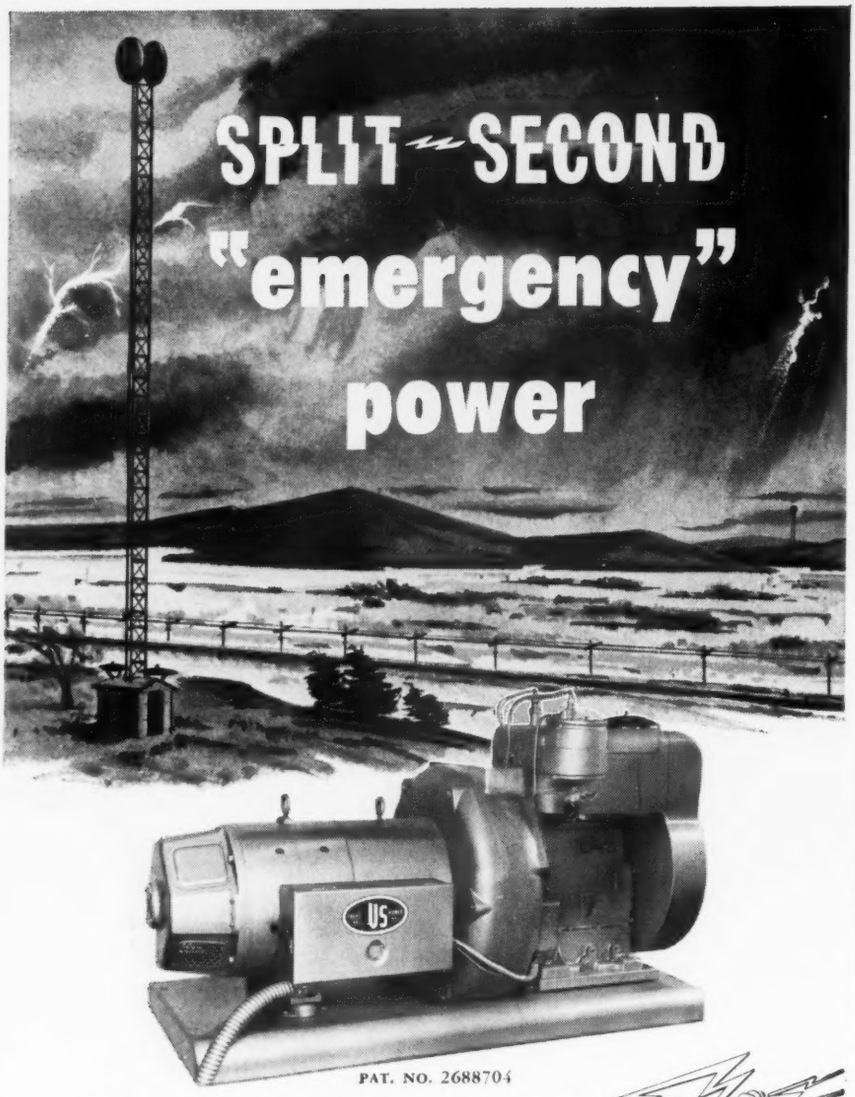
FOR SERVICE WORK . . . compartments provide space for the orderly storage of a wide assortment of tools and parts.

FOR CONSTRUCTION WORK . . . simplified, easy-to-use derrick handles poles up to 35 ft. in length. A 10,000 lb. underslung winch pays out cable beneath the body floor. A universal swivel sheave permits winch line pull in any direction, without limitation.

COMPLETE DESCRIPTION is given in Bulletin No. 118. A copy, with quotation, is yours for the asking.

Derrick utilizes flexible steel cable instead of conventional center leg. Stows in loading area rack when not in use.

POWERS-AMERICAN DIVISION
McCABE-POWERS
AUTO BODY COMPANY
5900 No. Broadway • St. Louis 15, Missouri
428 Latham Sq. Bldg. • Oakland 12, Calif.



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. . . With U.S. MICRO-POWER

BEFORE . . . voltage drops below a usable level . . . b e f o r e there is any loss of power to essential equipment . . . **MICRO-POWER IS IN ACTION.** Completely automatic, Micro-Power *operates with* the main source of power. No time-consuming "load transfers", no power "outages" . . . **EVEN FOR PRECIOUS SECONDS!**

Micro-Power is a complete stand-by service that replaces several units of costly, more complicated equipment. Electric plant, rectifier, battery banks and motor-generator **CAN ALL BE ELIMINATED** . . . with the installation of a single **MICRO-POWER UNIT. NEW INSTALLATIONS — SAVE UP TO $300 PER MILE!**

Write U. S. Motors for complete information, specifications and power curve charts.

UNITED STATES MOTORS CORPORATION
LIGHT US POWER
OSHKOSH • WISCONSIN

UNITED STATES MOTORS CORPORATION
558 Nebraska Street
OSHKOSH, WISCONSIN

technical consultant to the Ministry of Communications of the government of Turkey. In this capacity he was charged with making fundamental plans for setting up the Turkish communications system along modern lines.

Other positions he held included traffic supervisor for the Chile Telephone Co.; equipment engineer, plant superintendent, chief engineer and general manager of the Peruvian Telephone Co.; chief engineer for the Cuban Telephone Co.; chief engineer and member of the board of directors of the Spanish National Telephone System, and assistant vice president and division sales manager for the Federal Telephone & Radio Corp.

During World War II he served with the Air Force in the North African and Italian campaigns, attaining the rank of colonel. His decorations include the Order of the British Empire and the United States Bronze Star Medal.

He came to Michigan after serving since 1951 as assistant to the president of Federal Radio & Telephone Co., where he directed research on new products and coordinated engineering activities for electronic equipment.

Mr. Benckert, chief engineer of the Michigan company since June, 1953, and vice president and chief engineer since July, 1953, has a background of 25 years' experience in the telephone industry.

He started his career in Easton, Pa., with the Lehigh Telephone Co., and when that company was absorbed by Bell Telephone Co. of Pennsylvania, remained with that system. He occupied various positions in the engineering and plant deaprtments of the Bell Company. At the time he left the Bell Telephone Co. in February, 1950, he was on the staff of the chief engineer at Harrisburg, Pa.

Prior to accepting the position of chief engineer of the Michigan company, he was chief of the Engineering Division of the Rural Electrification Administration, Washington.

J. L. Malone Joins General of Indiana

H. E. Hussey, president of General Telephone Co. of Indiana, Inc., Lafayette, Ind., has announced the appointment of James L. Malone as director of industrial relations. Mr.

• Located near Pontiac, Mich., a four-mile sub-transmission line of Detroit Edison Company offers excellent testimony of Creosote's effectiveness as a wood preservative.

In 1929, 141 Creosoted poles were installed in this section. To date, 23 poles have been replaced . . . 22 of them due to road widening, lightning damage, vehicle accidents, and the like. Only one was lost to wood's natural enemies.

What's more, Detroit Edison reports that maintenance costs on these poles treated with Creosote are negligible. An official remarks, "They require nothing more than periodic checking—a big factor when maintenance costs can be a big chunk of operating expenses."

Thanks to service records like this—established in nearly a century of use—you *know* you can depend on Creosote as a wood preservative.

And you have extra assurance when U·S·S Creosote is used, for it is a uniform product made to give you uniformly good results. For complete information, contact our nearest Coal Chemical Sales office or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

HERE are some of the Creosoted poles in Detroit Edison's sub-transmission line near Pontiac, Mich. Three-fourths of the poles in the Detroit Edison system are protected by Creosote.

U·S·S CREOSOTE

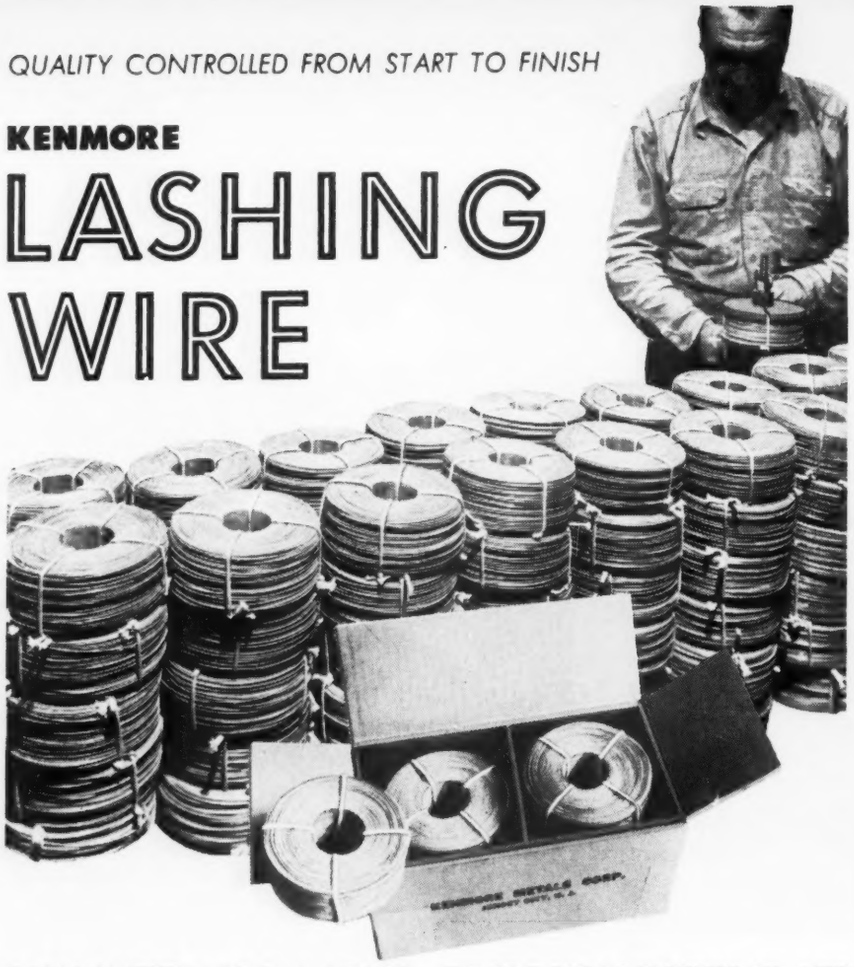
USS

UNITED STATES STEEL

QUALITY CONTROLLED FROM START TO FINISH

KENMORE

LASHING WIRE



GUARANTEED FOR A LONG, CORROSION-RESISTING LIFE

who are Kenmore's customers?

The biggest users in the telephone and communications field. They include the BELL SYSTEM, the Army Signal Corps, the Coast Guard and other important communications operations in all fields.

why you should use Kenmore lashing wire

Because it meets the most exacting specifications of the telephone industry—assures perfect roundness—is free from surface imperfections—observes close tolerances—has high corrosion resistance.

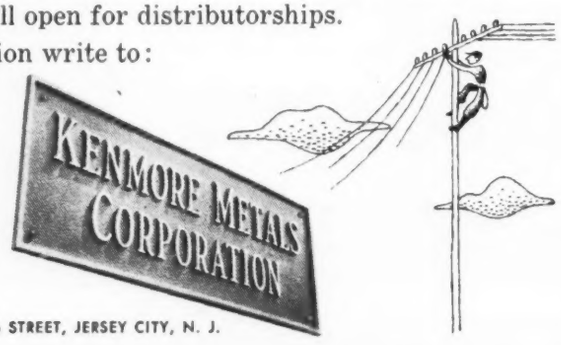
All manufacturing operations in one plant. KENMORE cable spinning wire is backed by many years of scientific testing and experimentation.

KENMORE lashing wire fits all standard cable spinning equipment. Complete stock of all standard sizes available for immediate delivery through your distributor or jobber.

Some territories still open for distributorships.

For more information write to:

DEPT. T.E.



365 9th STREET, JERSEY CITY, N. J.

Malone will assume the responsibility for labor relations and personnel administration, which functions were previously under the jurisdiction of H. G. Counsman, secretary-treasurer of the company.

Mr. Malone, a graduate of Boston College, has been continuously employed in personnel work since 1946. Prior to the acceptance of his

JAMES L. MALONE, director of industrial relations, General Telephone Co., of Indiana, Inc., Lafayette, Ind.

present position, Mr. Malone served as assistant personnel director of Supplee-Wills-Jones Milk Co., a division of National Dairy Products Co., and as personnel director of Snellenburgs, Inc., in Philadelphia, Pa.

Mr. Malone served four years in the Marine Corps during World War II and rose from Private to the rank of Captain. He is at present a Major in the Marine Corps Reserve.

Mr. Hussey stated that the appointment of Mr. Malone was occasioned by the expansion and growth of the Company which has brought about a need for a redistribution of staff assignments.

Subscribers Ask Hike In Phone Rates

THE INDIANA Public Service commission confessed last month it had seen almost everything when all but 10 subscribers petitioned to have the rates of the Burrows Telephone Co. hiked.

Customers of the exchange, which operates between Delphi and Logansport, asked private line rates be boosted from $1.75 to $3.50 and party lines from $1.50 to $2.50.

Wondering about the Weather?

No matter what the weather, *people will talk about it!* And when that happens in our town, someone's bound to mention the National Bank. That's because of their new service — the Peatrophone Weather Forecast. You just dial your phone and get the latest report, and then a few words about the different advantages National offers you. Kind of a reminder that whether you carry an umbrella or not, every day is a good day to bank.

Peatrophone provides a real service — one you feel free to use without having to bother the radio station, the newspaper, the airport or even the weather bureau.

Bank officials are enthusiastic about Peatrophone's weather forecast too. It has made a lot of new friends for the National and it costs so little! Another trunk line, a few pennies a day for the Peatrophone rental, and a few minutes to record the daily or hourly weather report. A mighty small outlay for a new service that brings up the bank's name with appreciation, every time the weather is mentioned!

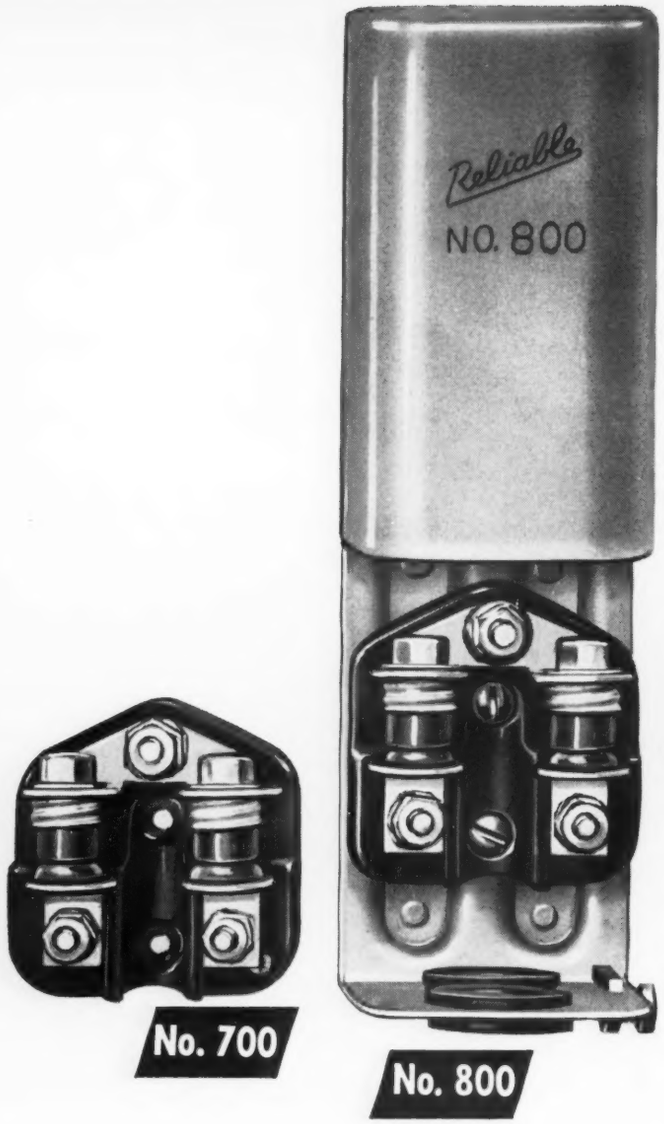
Just call the bank!

TELEPHONE COMPANIES: Have you considered the many ways Peatrophone can be used as a public relations builder for utilities, banks and stores? *And as a revenue builder for your company?*

Write today for complete information and literature on Peatrophone — your new source of revenue.

Note: Selective harmonic ringing subsets now available — all frequencies.

TELEPHONE ANSWERING & RECORDING CORP.
342 Madison Ave. New York 17, N. Y.



These FUSELESS STATION PROTECTORS ARE UL APPROVED

Reliable

No. 700 for Indoors
No. 800 for Outdoors

Recently added to the Reliable Line, these Fuseless Station Protectors, approved and listed by Underwriters' Laboratories, Inc., fully satisfy the requirements of the 1953 National Electric Code (Article 800).

In addition to maximum protection, both models feature interchangeability and replaceability of parts. The No. 700 (for indoor use) mounts two No. 504 Protector Units, which are of the self-contained, weatherproof, screw-in type. Each No. 504 Unit contains a molded contact with a beryllium copper contact spring. Two carbon electrodes are spaced approximately .0035 to provide an air gap arrester. A low melting point alloy pellet is employed as a fusible spacer to provide metallic grounding in the event of heavy current discharge. Static discharges will not cause metallic grounding except with heavy, or repeated light, discharges — power contact will do so.

The No. 800 is essentially the No. 700 with added protection against weather and insects including an aluminum bracket and a weatherproof cover.

RELIABLE ELECTRIC COMPANY
3145 Carroll Avenue, Chicago 12, Illinois

Reliable

Telephone Protective and Terminal Equipment for all Station, Line and Central Office Needs.

OVER 45 YEARS' SERVICE TO THE UTILITIES

EDITORIAL

Telephone Engineer

USE 'EM OR LOSE 'EM!

THE INDEPENDENT segment of the telephone industry is losing, practically by default, most of the present value and also of the greater potential value of a privilege to which it is entitled but of which it is making relatively little use.

That is the conviction of a committee of nine experienced Independent telephone men. The committee is the Radio Service Committee of the United States Independent Telephone Association.

For several years this Committee has been pointing out the fact that Independent telephone companies as a whole have made relatively few applications for and relatively little use of radio frequency channels that have been available to them. The result, says the Committee, is that many of the radio channels that might be available to Independent companies have been taken up by other industries.

The demand by such other industries for frequencies to provide essential services is so great that radio channels cannot be allowed to lie idle. If Independent telephone companies will not make use of frequencies they might have, someone else will — since the Federal Communications Commission cannot, under such circumstances, properly refuse such other applications. And frequencies allocated to others are gone from the telephone company forever.

Mr. C. H. McLean, Chairman of the Radio Service Committee — a telephone man with more than 25 years of experience in radiotelephony in the U. S. A., Canada and other countries — said in his recent convention report:

> "As you are aware, there is only so much frequency space available in the radio spectrum as we now know it and the Federal Communications Commission is doing the best job possible to see that these frequencies are assigned for the most essential and useful public service . . . While Independents have been marking time, so to speak, other interests have been active in taking advantage of radio as a medium for providing telephone communication, and are continually seeking additional frequency space for further expansion.
>
> "Independent telephone companies, in addition to meeting requirements for mobile, rural and point-to-point service within their system where radio is the logical medium, should also be in a position to meet all other service requirements in their area in which radio is the best medium of providing such service.
>
> ". . . you are reminded that if you delay too long you may wake up to find that some other entity is already well established in essential services, and frequency assignments are no longer available."

Undoubtedly there are Independent telephone managements who fear the complexities of radio operation and maintenance, as well as the investment required. But those experienced in radio-telephony stress the fact that any Independent company, large or small, can establish radio service — starting perhaps with mobile service — on a nominal basis, and that maintenance is relatively simple.

They also point out that, if Independent companies would actively step into this radio situation, manufacturers would be encouraged to produce the equipment on a "package" basis, thus greatly simplifying the proposition.

The principal point to all this is that the Independent telephone industry, as a whole, is now letting its rights to frequency allocations go by default.

Those allocations are valuable now; they will be much more valuable in years to come. It is better to use them than to lose them.

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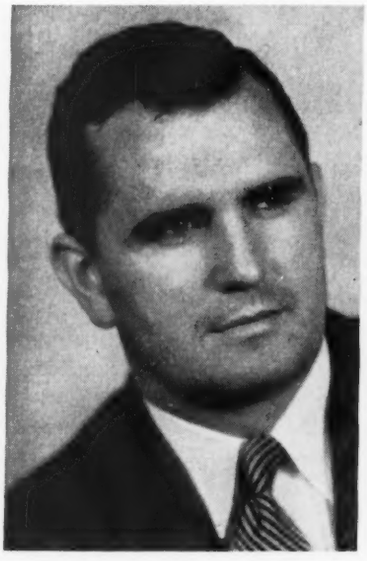
TELE-VIEWS

L. H. Meyer, president of the General Telephone Co. of Michigan, has announced the appointment of WILLIAM W. GORDINIER as industrial relations director. Mr. Gordinier was brought into the General System to organize and expand the personal facilities and services in keeping with the company's rapid and continuing growth.

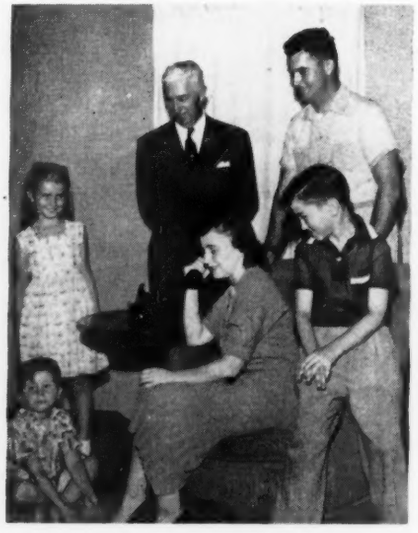
GENERAL TEL. CO. OF ILL. presented this attractive exhibit in the Exposition Building during the Illinois State Fair

As visitors stopped at the display, one of the attendants explained some of the basic statistics and facts about the company, the General Telephone System or about the Independent telephone industry. Frequently, the visitor asked for additional information. If he was a General Telephone Subscriber, or if he had friends or relatives in one of the exchanges, he was invited to spin the wheel (at left) in an attempt to win a free telephone call. A library of current directories assisted in determining the correct telephone number. There was a total of 155 winners during the 10 days, but only 104 telephone calls were completed, mostly due to the fact that the called parties were not at home. The total attendance at the booth was estimated to be between 19,000 and 20,000.

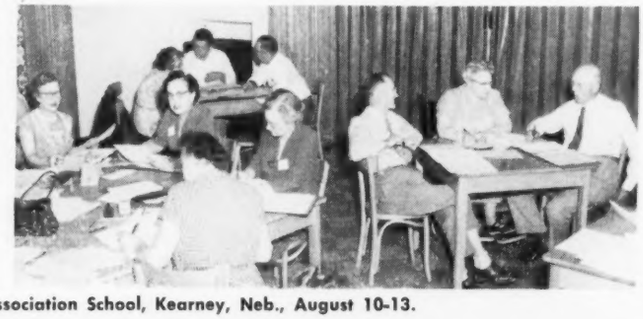
SAMUEL S. LONG, JR. has been elected a director and vice president of the General Telephone Co. of Kentucky. In his new capacity he will be assigned the duties of vice president - operations. Prior to his new assignment, Mr. Long was general traffic superintendent. He has been with the General System for approx. 10 years.



RAYMOND SOARD, JR. has been promoted from general traffic engineer to general traffic manager of General Telephone Co. of Kentucky. Mr. Soard has been with the Kentucky company about 10 years. He is a graduate of the University of Kentucky with a B. S. in Electrical Engineering.



Executive vice president HARLAN W. HOLMWOOD of General Telephone Co. of California (standing center) watches as MRS. ROBERT PETERSSEN places call from the company's 600,000th telephone which had just been installed in her West Covina home. Standing, left and right, are MARGARET and MR. PETERSSEN. Seated, left and right, MARTIN and ROBERT, Jr.



CLASSROOM SCENES at Nebraska Telephone Association School, Kearney, Neb., August 10-13.

Modern Cable Construction . . . . .

By JOHN S. REED

IN SECTION IV-B, Mr. Reed discusses — (1) jute-protected cable; (2) thermoplastic-jacketed cable; and (3) uses of thermoplastic-jacketed and insulated cables.

JUTE PROTECTED cable is used in exchange distribution plant. Because of the protective coating it is comparatively free from soil corrosion or electrolysis difficulties and can be expected to have long life buried directly in the soil. It finds its widest use in residential areas in which, due to civic pride or other reasons, an economical underground distribution plant is desired. The cable can be ploughed directly into the soil, thus avoiding the necessity for trenching and back filling. In most cases, the cost of placing jute protected cable for exchange distribution is higher than installing aerial cable.

Jute protected cable is also useful for feeding toll or farm leads extending beyond the city limits and where long runs without the necessity for intermediate terminals are possible. It has the advantage of negligible maintenance cost and freedom from storm damage.

Tape armored cable has the advantages of jute protected cable plus the added feature of protection against mechanical damage. Where toll or large size trunk or exchange cables are buried directly in the soil, it is generally advisable to use tape armored cable in preference to jute protected cable in order to get the added protection which the armor provides.

It was previously mentioned that armored cable with a single layer of steel tape was employed to protect damage to the cable from gophers where the cable is buried. In some sections of the country, however, gophers have gnawed off the outer jute and asphalt covering exposing the steel tape to rusting and later resulting in the rodents penetrating to the cable core. Such ravages have been successfully combated by installing armored cable with three copper tapes replacing the single layer of steel tape. The copper tape also affords some protection from lightning entering the ground through tree roots.

Submarine and gulley cable with its added mechanical protection and greater strength does not find much application by the smaller companies. Its use is confined mainly to the

Table III—22 Gauge Paper Insulated Lead Sheathed Cable*

Conductors: Size 22 A.W.G. with single wrap dry paper insulation.
Color Coding: Standard color groups.
Mutual Capacitance (a-c testing): Average not exceeding .090 microfarads per mile of cable.
Conductor Resistance: Not to exceed 92 ohms per mile of cable (68°F.).
Insulation Resistance: Not less than 500 megohm miles.
Dielectric Strength: Insulation capable of withstanding a-c test potential for 2 seconds (maximum instantaneous) of 500 volts between conductors, and 1400 volts between conductors and sheath.
Attenuation: Approximately 1.80 decibels per loop mile (1000 cycles).

Number of Pairs in Cable	Number of Guaranteed Pairs	Stand. Reel Length Feet	Sheath Thickness Inches	Nominal outside Diameter Inches	Net Weight lbs. Per 1000 Ft.
6	5	3500	.061	.35	304
11	10	3500	.063	.43	405
16	15	3500	.064	.46	464
26	25	3500	.066	.55	615
51	50	3000	.070	.71	923
76	75	2500	.073	.83	1187
101	100	2500	.076	.93	1447
152	150	1600	.080	1.11	1937
202	200	1600	.084	1.25	2400
303	300	1400	.091	1.50	3316
404	400	1200	.095	1.71	4145
606	601	900	.104	2.06	5805
909	903	650	.115	2.49	8221

*Data on 22SU-90 and 22S-90 Telephone Cable furnished through courtesy of General Cable Corporation.

larger companies and then only for special situations which because of the nature of the service provided require added protection.

Thermoplastic Jacketed Cable

LEAD COVERED cable with its dry-paper insulation over the core and individual conductors have given good service for many years. Lead meets the requirements for a sheath material that is sufficiently pliable to permit bending of the cable within reasonable limits and at the same time is strong enough to protect the conductors and insulation from damage. Lead has been about the only material that could be extruded around a paper wrapped core without injury to the insulation. Lead covered cable, however, requires proper installation methods to minimize crystallization of the sheath resulting from vibration and repeated expansion and contraction of this material under temperature changes.

Dry manila paper was originally selected because of its low dielectric properties and the low capacitance of cable pairs when the conductors are insulated with paper pulp or ribbon wrapping. The combination of lead covering and dry-paper insulation was so satisfactory that telephone cables using these materials have been manufactured for over sixty years and are still made in considerable quantity. The only improvements have been the addition of a small percentage of antimony and other metals to the lead sheath to improve its resistance to crystallization and to facilitate its extrusion, and the increase in the number of pairs contained within the same sheath diameter through improved manufacturing techniques.

The growing shortage of the world's lead supply resulting principally from the increasing uses of this metal by the telephone and other industries, such as the storage battery group, however, made it necessary to investigate other materials that would be as satisfactory or possibly better than lead as a protective covering. Polyethylene and polyvinylchloride when properly compounded were found to possess the desired characteristics.

Polyethylene is made by subjecting ethylene gas to extremely high pressures at greatly elevated temperatures. In this process, ethylene is polymerized into long chain-like molecules and becomes a translucent, waxy solid which is chemically inert and has excellent electrical insulating properties. Exposure to sunlight causes this substance to lose its strength and become brittle. However, the addition of a suitable antioxidant in a final stage in the manufacture of polyethylene prevents this

Table IV—24 Gauge Paper Insulated Lead Sheathed Cable*

Conductors: Size 24 A.W.G. with single wrap dry paper insulation.
Color Coding: Standard color groups
Mutual Capacitance (a-c testing): Average not exceeding .090 microfarads per mile of cable.
Conductor Resistance: Not to exceed 145 ohms per mile of cable (68°F.).
Insulation Resistance: Not less than 500 megohm miles.
Dielectric Strength: Insulation capable of withstanding a-c test potential for 2 seconds (maximum instantaneous) of 500 volts between conductors, and 1400 volts between conductors and sheath.
Attenuation: Approximately 2.20 decibels per loop mile (1000 cycles).

Number of Pairs in Cable	Number of Guaranteed Pairs	Stand. Reel Length Feet	Sheath Thickness Inches	Nominal outside Diameter Inches	Net Weight lbs. Per 1000 Ft.
11	10	3500	.061	.37	328
16	15	3500	.062	.41	386
26	25	3500	.064	.48	487
51	50	3000	.067	.59	696
76	75	2500	.069	.69	887
101	100	2500	.071	.78	1068
152	150	2500	.075	.02	1414
202	200	1800	.078	1.04	1730
303	300	1600	.082	1.24	2328
404	400	1400	.087	1.41	2925
606	601	1100	.093	1.69	4016
900	902	900	.101	2.04	5612
1212	1203	650	.109	2.34	7199
1515	1505	650	.115	2.61	8747

*Data on 24SU-90 and 24S-90 Telephone Cable furnished through courtesy of General Cable Corporation.

Table V—26 Gauge Paper Insulated Lead Sheathed Cable*

Conductors: Size 26 A.W.G. with single wrap dry paper insulation.
Color Coding: Standard color groups.
Mutual Capacitance (a-c testing): Average not exceeding .085 microfarads per mile of cable.
Conductor Resistance: Not to exceed 230 ohms per mile of cable (68°F.).
Insulation Resistance: Not less than 500 megohm miles.
Dielectric Strength: Insulation capable of withstanding a-c test potential for 2 seconds (maximum instantaneous) of 500 volts between conductors, and 12 volts between conductors and sheath.
Attenuation: Approximately 2.90 decibels per loop mile (1000 cycles).

Number of Pairs in Cable	Number of Guaranteed Pairs	Stand. Reel Length Feet	Sheath Thickness Inches	Nominal outside Diameter Inches	Net Weight lbs. Per 1000 Ft.
11	10	3500	.061	.33	277
16	15	3500	.061	.36	314
26	25	3500	.063	.43	409
51	50	3000	.065	.53	566
76	75	2500	.067	.61	706
101	100	2500	.069	.69	853
152	150	2500	.072	.80	1091
202	200	1800	.074	.90	1318
303	300	1600	.078	1.07	1752
404	400	1400	.081	1.20	2141
606	601	1100	.087	1.44	2928
909	902	900	.094	1.74	4050
1212	1203	800	.100	2.00	5150
1515	1505	800	.106	2.22	6233
1818	1806	800	.110	2.41	7237
2121	2108	800	.115	2.61	8319

*Data on 26SU-85 and 26S-85 Telephone Cable furnished through courtesy of General Cable Corporation.

deterioration. The best oxidant has been found to be a small percentage of finely divided carbon well dispersed in the polyethylene material. When properly compounded polyethylene is stated to have a life expectancy of 20 to 25 years.

Polyvinylchloride is another successful material used for jacketing telephone cables. It is a resin type thermoplastic, which when properly plasticized, provides a tough coating that resists abrasion and exposure to sunlight and heat. This compound will not sustain a flame and is substantially unaffected by acids, alkalies, and most other chemicals. One manufacturer reports satisfactory performance of plasticized polyvinylchloride in outdoor service for over 18 years. A sample of electrical distribution cable jacketed with this thermoplastic examined after 10 years of service outdoors showed practically no change in physical or electrical properties.

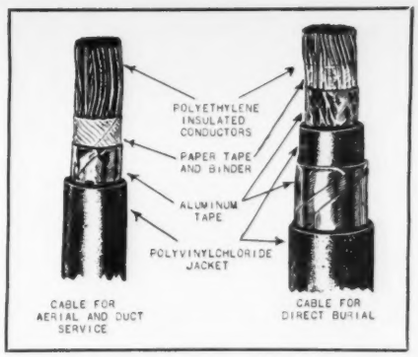


FIGURE 50: — Showing construction of polyvinylchloride jacketed cables for aerial and duct service and for direct burial in ground. (Ankoseal Telephone Cable — The Ansonia Wire & Cable Co.)

When the outer jacket of the telephone cable is composed of polyvinyl chloride or polyethylene, the most satisfactory insulation for the conductors is stabilized polyethylene. This material is applied in a very thin layer on the conductors which results in a capacitance and attenuation value lower than for corresponding sizes of lead sheathed dry-paper insulated cable. Although the insulation is quite thin, it has a high dielectric strength. Its non-hygroscopic property minimizes shorting or grounding of the conductors in event of the outer sheath being cut or damaged.

The polyethylene insulated conductors are twisted together in pairs and then combined to form the core of the cable. After applying the binder, a spiral layer of aluminum tape is wound over the core for the shield. This shield, when connected to

Table VI — Electrical Characteristics of Polyethylene Exchange Area Cable for Aerial and Duct Use.*

Mutual Capacitance: The average for any reel shall not exceed .09 microfarads per mile (measured at 1000 cps).

Conductor Resistance: at 68°F.
#22—not to exceed 92 ohms per mile of cable
#19—not to exceed 46 ohms per mile of cable

Insulation Resistance: at 60°F.
Any conductor measured against all other conductors and shield, grounded, shall have an insulation resistance of not less than 1000 megohms-mile.

Dielectric Strength:
Conductor to Conductor—not less than—1000 volts rms.
Conductor to Shield—not less than—3500 volts rms.

Attenuation:
Nominal—#22 cables—1.73 db/mile
Nominal—#19 cables—1.34 db/mile
Transmission distance—non-loaded—based on 30 db loss—
Nominal—#22 cables—17.4 miles
Nominal—#19 cables—22.4 miles

CONSTRUCTION

Each conductor is bare annealed copper and is furnished in No. 24, No. 22 and No. 19 gage. Insulation is stabilized polyethylene with a nominal wall of 1/64". Its high dielectric strength insures satisfactory operation of the cable even if the sheath becomes damaged.
One pair of each cable has one red leg and one orange leg for use as a tracer pair. All other pairs have one red leg and one natural leg. Pairs are cabled into a round core. To prevent cross-talk, the length of lay is varied for adjacent pairs. The core is wrapped spirally with polyethylene tape for further protection and then covered with an aluminum shield. This shield, when grounded, protects the cable from damage by lightning, prevents low frequency induction and consequent noisy circuits. The jacket is black weather-resistant polyethylene, assuring long service life.

Cat. No.	No. Pairs Total	No. Pairs Guart'd	Nom. Wall Jacket	Approx. O.D.	Approx. Net Wt. Per 1000 ft. Pounds	Approx. Gr. Wt. Per 1000 ft. Pounds	Ft. Per Reel
No. 24 AWG Conductor							
1201	11	11	.050"	.440"	78	96	5000
1202	16	15	.050"	.515"	107	132	5000
1203	26	25	.060"	.630"	158	194	5000
1204	51	50	.070"	.860"	291	350	2500
No. 22 AWG Conductor							
1231	11	11	.050"	.480"	103	128	5000
1232	16	15	.050"	.550"	139	164	5000
1233	26	25	.060"	.700"	218	253	5000
1234	51	50	.070"	.930"	400	459	2500
No. 19 AWG Conductor							
1261	11	11	.050"	.550"	161	186	5000
1262	16	15	.060"	.660"	230	266	5000
1263	26	25	.060"	.800"	351	407	5000
1264	51	50	.070"	1.080"	657	751	2500
Shielded Self-Supporting Multiple Drop Cable							
1281	6	6	.050"	.460"	110	135	5000

This cable is similar in construction to Aerial and Duct Cable except the #19 A.W.G. conductors are medium hard drawn copper. The cable can be used for multiple drops to small businesses and apartment buildings and also for pole runs.

*Data on Whitney Blake Telecable copyrighted 1954 and furnished through courtesy of Whitney Blake Company.

Note: Telecable is now available in 76-pair and 101-pair sizes, No.24 AWG, No. 22 AWG, and No. 19 AWG. Other sizes and pairs are available on special order.

ground, protects the cable from lightning and reduces low frequency induction to a negligible value.

Tables VI and VII lists sizes of standard thermoplastic telephone cables using aluminum tape shield and describes their electrical characteristics. Thermoplastic cables with conductors smaller than 24 gauge are not presently available due to the difficulty of applying thermoplastic insulation to the smaller diameter conductors.

Uses of Thermoplastic Jacketed & Insulated Cables

THE SIZES of thermoplastic jacketed and insulated cables available are well adapted to aerial and underground conduit installation. For direct burial, polyvinylchloride jacketed cables are available in double jacketed form with aluminum tape shield between the inner and outer jackets and between the inner jacket and core. *Figure* 50 illustrates a typical construction of

Table VII — Technical Data on Polyvinylchloride Jacketed Cables for Aerial and Duct Service and for Direct Burial in Ground.*

Types 775 P and 775 AP	
Conductors	Soft bare copper per ASTM B-3
Insulation	Stabilized Polyethylene
Shield tape	.004-3S Aluminum
Jacket	Ankoseal Plasticized Polyvinyl Chloride standard operating range —40 to +80°C
AP Types only	
Armor tape	.013-3S aluminum
Outer Jacket	Ankoseal Plasticized Polyvinyl Chloride standard operating range —40 to +80°C
AC Test Voltage	1000 V.
Insulation Resistance	500 megohm miles minimum at 60°F—any conductor to all other conductors and shield
Mutual Capacity mfd/mile	24 gauge .075, 22 gauge .081, 19 gauge
Db/mile (600 ohm Loading)	.106 24 gauge 1.3, 22 gauge 0.95, 19 gauge 0.65

Type 775 P Aerial and Duct Cable

Total No. Pairs	Guart'd No. Pairs	Approx. O. D.	Approx. Net Wgt Lbs/M Ft.	Nominal Reel Length
SIZE 24 COPPER				
11	10	.440	102	5000
16	15	.520	137	3000
26	25	.615	195	5000
51	50	.860	360	3000
76	75	.990	520	2500
101	100	1.140	663	2000
152	150	1.250	925	1500
202	200	1.630	1298	1500
303	300	2.000	1861	1000
404	400	2.190	2386	1000
SIZE 22 COPPER				
11	10	.460	116	5000
16	15	.540	155	3000
26	25	.645	225	5000
51	50	.905	415	3000
76	75	1.050	606	2000
101	100	1.200	776	2000
152	150	1.300	1100	1500
202	200	1.720	1520	2000
303	300	2.100	2175	1000
404	400	2.335	2823	1000
SIZE 19 COPPER				
11	10	.540	170	5000
16	15	.630	229	3000
26	25	.745	339	5000
51	50	1.050	637	2500
76	75	1.290	948	3000
101	100	1.450	1215	3000
152	150	1.650	1725	2000
202	200	1.975	2377	1000
303	300	2.350	3434	1000
404	400	2.740	4507	1000

Type 775 AP Direct Burial Cable

Total No. Pairs	Guart'd No. Pairs	Approx. O. D.	Approx. Net Wgt Lbs/M Ft.	Nominal Reel Length
SIZE 24 COPPER				
11	10	.595	213	4000
16	15	.675	262	3000
26	25	.770	338	3000
51	50	1.035	575	3000
76	75	1.195	804	2500
101	100	1.345	981	2000
152	150	1.490	1295	2000
202	200	1.900	1875	1000
303	300	2.260	2531	1000
404	400	2.455	3119	1000
SIZE 22 COPPER				
11	10	.615	231	4000
16	15	.695	285	3000
26	25	.800	375	5000
51	50	1.080	640	5000
76	75	1.255	905	4000
101	100	1.405	1111	3000
152	150	1.535	1420	2000
202	200	1.990	2121	1000
303	300	2.385	2921	1000
404	400	2.600	3603	1000
SIZE 19 COPPER				
11	10	.695	235	3000
16	15	.785	376	4000
26	25	.990	507	4000
51	50	1.225	892	4000
76	75	1.495	1310	3000
101	100	1.655	1618	2000
152	150	1.910	2415	2000
202	200	2.250	3076	1000
303	300	2.635	4255	1000
404	400	3.005	5418	1000

*Data on Ankoseal telephone cables furnished through courtesy of the Ansonia Wire & Cable Co.

thermoplastic cable employing a polyvinylchloride jacket.

Because of their relatively low cost compared to lead sheathed cable, light weight, and east of handling, thermoplastic cables have become very popular with the smaller independent companies. As more satisfactory splicing and terminating methods are developed, these cables will find wider use.

Thermoplastic Cables Used in the Bell System

THERMOPLASTIC cables used in the Bell System are constructed in a different manner from the cables just described. Although these cables employ a black polyethylene jacket, the core is composed of dry-paper insulated conductors with segments of corrugated aluminum surrounding it. A water resistant cement is applied to seal the overlapping edges of the corrugated sheath and to cover the sheathing as the jacket is extruded over it. This type of cable is called "Alpeth," a term coined from parts of the words "aluminum" and "polyethylene." *Figure* 51 illustrates a toll and rural lead of Alpeth cable and *Figure* 52 shows a typical splice in this cable.

Since paper insulated conductors are employed in the Alpeth cable, care is needed to adequately seal the sheath joints against possible moisture seepage. A terne plated steel envelope was later added over the aluminum sheath. This steel plate is also corrugated and thus fits closely over the aluminum envelope. The overlapping seam of the terne plate material can be soldered and thus insure a better seal, making possible a reduction in the thickness of the

FIGURE 51: — Toll and rural aerial cable lead using "Alpeth" polyethylene jacketed cable. The term "Alpeth" is derived from parts of the words "aluminum" and "polyethylene."

polyethylene jacket. Another advantage is that lead sleeves can be wiped directly to the terne plated steel, thus facilitating the splicing of the cable. The expression coined for this kind of cable is "Stalpeth."

The Bell System also employs lead sheathed cables with a jacket of polyethylene between the outer sheath and the core in buried toll cable installations. When mechanical protection is needed, tape armor is added over the lead sheath with an extra covering of jute if the latter is required to prevent corrosion. These composite sheath cables were developed to reduce lightning damage to the cables by interposing a high dielectric strength insulation between the core and the lead sheath.

(To Be Continued)

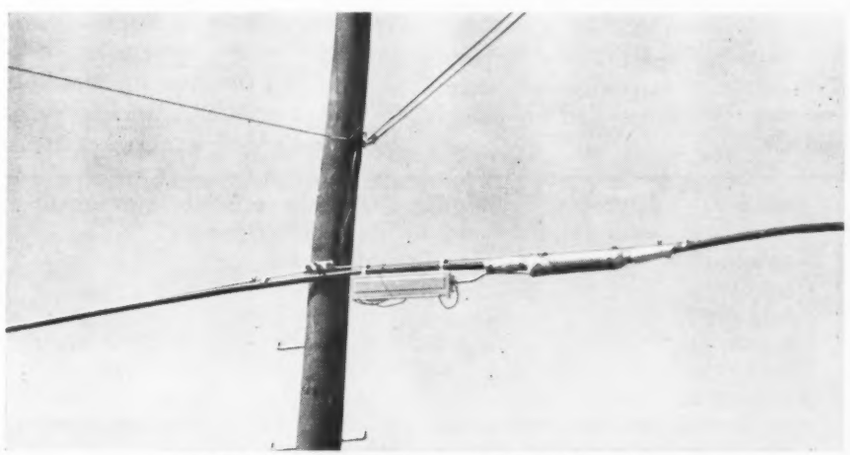


FIGURE 52: — Typical splice terminal in Alpeth cable.

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Designing Modern Communication Lines

By J. N. PETRIE*

PART THREE of Mr. Petrie's article discusses — (1) configuration of the line cross section, (2) the phantom circuit, and (3) noise, crosstalk and transmission performance of carrier frequencies.

THE CROSSTALK coupling between the various pairs on an open-wire line, as well as the noise effects due to induction from external sources, depends to a considerable extent upon the relative positions and spacings of the various wires on the line.

Prior to the extensive operation of carrier systems it was customary to space all the wires on a given cross-arm 12″ apart, except for the pole pairs which were usually placed 18″ apart. Also it was customary to separate adjacent cross arms 24″. This arrangement is usually referred to as "12 inch spacing" and will be found in a very large proportion of the older outside plant utilized for long distance purposes.

It may be appropriate to mention at this time that circuits constructed on the "12 inch spacing" basis can be very frequently utilized without modification for relatively short carrier systems operating below 35 kc. It is even possible in some cases to place several such systems on the same pole line.

In recent years it has become necessary to place 35 kc carrier systems on every pair of wires on an open-wire line, and in many cases to extend the range of operating frequencies upward to approximately 150 kc. Under these conditions it has become increasingly difficult to adequately reduce the crosstalk coupling effects between paralleling pairs. To overcome this difficulty, it is necessary, in addition to employing suitable transposition patterns, to employ wire spacings that will materially reduce the coupling coefficients between the various wires on the line. This has quite generally led to the use of 8″ and to some extent 6″ spacing of wires.

In addition to reducing the crosstalk coupling, closer spaced wires also are effective in limiting the noise due to induction, static, long wave radio or other external sources of interference. No change in configuration of the pole pair spacing of 18″ has been made where this pair is retained, but on many modern long distance lines designed primarily for carrier transmission the pole pair is omitted entirely.

From time to time different structural arrangements, or configurations have been designed for controlling the crosstalk coupling between the various wires on the line. To facilitate description the configurations are considered in groups of two horizontally adjacent non-pole pairs and are described by this spacing between the two wires of a pair and the spacing between the adjacent wires of the two pairs as well as the vertical separation between wires on adjacent crossarms.

For example, when 8″ spacing is used between wires 1-2 and 3-4 with 16″ spacing between wires 2 and 3 with the vertical separation between adjacent cross-arms being 24″, the resulting configuration is designated as 8-16-8/24 spacing.

In *Table V*, below, several of the more common types of configuration found in the open-wire plant are tabulated together with the approximate relative crosstalk and noise performance as a function of wire spacing. For this comparison it is assumed that the open-wire facilities are non-phantomed, non-pole pairs, that they are point bracket trans-

TABLE V: — Approximate Relative Performance in db Impairment with Respect to 6-30-6/24 Configuration.

Configuration	Crosstalk*	Noise
6-30-6/24	0	0
6-24-6/24	3	0
8-24-8/24	5	3
8-16-8/24	10	3
12-12-12/24	16	6

*For limiting pair combinations such as 1-2:3-4, 1-2:11-12 or other pairs occupying similarly related pin positions.

*Mr. Petrie is Manager, Carrier & Radio Sales, Automatic Electric Sales Co.

posed, and that horizontally or diagonally adjacent pole pairs are not present on the line. It is also assumed that other variables such as the range of frequencies involved, the types of transposition systems employed, and irregularity effects resulting from all causes are the same in each case. The latter assumption is not strictly true in practice, consequently the effects of some of these variables will be discussed in greater detail later.

It should be noted in the foregoing *Table V* that 24″ crossarm separation is assumed for comparative purposes. However, under certain conditions, which will be referred to later, 36″ crossarm separation is used for Type "J" carrier operation. When this greater separation is used it provides about 6 db better crosstalk performance in the Type "J" frequency range. It is significant to note that only relatively minor improvements are accomplished in going from the 8-24-8/24 to the 6-30-6/24 spacing. This is significant since, in general, for long span construction of the order of 330′ and average wind conditions the 8″ spacing will usually be mandatory.

It should also be noted that when pole pairs are installed on the line they will have a material effect on the crosstalk performance at the higher carrier frequencies and particularly in the case of those pairs which are adjacent to them.

As a result crosstalk between 2 type "J" carrier systems (or other systems operating in this general frequency range) on pairs 3-4 and 7-8 respectively or on other pair combinations horizontally adjacent to intervening pole pairs will be increased by the presence of these pole pairs. The relative crosstalk performance under these conditions in these higher carrier frequency regions is indicated in *Table VI*, (below) for several of the more usual configurations, the same assumptions being made as in the previous case.

It is significant to note from *Table VI* (below) that there is a difference of 30 db between the best arrangement without pole pairs and the worst combination caused by the presence of pole pairs. In fact, the influence of pole pairs on the crosstalk between their adjacent non-pole pairs is probably the controlling consideration when high frequency carrier operation on the latter pairs is contemplated.

In view of this very large influence which the pole pairs have it is desirable to dispense with them altogether whenever this type of carrier operation is involved. In those situations where the pole pairs cannot be dispensed with for one reason or another, it will be necessary to provide closer spaced pairs, compandor equipment and/or special transposition arrangements for the pole pairs. And even then these combined remedial measures may not make it feasible to obtain entirely satisfactory crosstalk performance for the highest frequency channels in the long systems.

From the foregoing discussion it will be quite evident that the use of pole pairs in new line construction or the provision of such circuits on existing lines requires careful consideration with respect to the possible restrictive effect their presence may have as compared to their ultimate worth in any given situation.

Situations frequently arise in which it is proposed to place new wire on existing crossarms which do not have the required pin spacings for the transmission characteristics desired. Also frequently existing wire is to be used for carrier operation, especially in the 160 KC frequency range, which does not have the required spacing. In these cases the problem of modifying the existing wire configuration arises. In some instances the modification presents no particular difficulty or excessive cost; however, in other situations greater expense is involved and undesirable service interruptions are likely to occur unless the facilities to be rearranged can be removed from service during the period of the work.

In view of these situations it is undesirable to re-space existing wire unless it is absolutely essential to avoid intolerable crosstalk and/or noise effects. In general this treatment should only be considered after it has been demonstrated that the utilization of compandors does not provide adequate noise and crosstalk control to provide usable commercial circuits.

If it should become necessary to convert from the very common 12-12-12/24 configuration to some one of the other arrangements, consideration should be given to the following pertinent data:

(1) Any two horizontally adjacent non-pole pairs can be respaced from the 12-12-12 to the 6-24-6 configuration by relocating two of the four pins involved and the spacing between the pole pins and the adjacent non-pole pins remains unchanged. Conversion to the 8-24-8 requires relocating three of the four pins and decreases the spacing between the pole pins and adjacent non-pole pins from 12 to 8″. As a result conversion to the 8-24-8 rather than 6-24-6 arrangement is approximately 25% more costly, also the 8-24-8 spacing is approximately 9 db less effective with respect to crosstalk mitigation in the 160 kc frequency range. For these reasons it is usually desirable to employ 6-24-6 instead of the 8-24-8 spacing unless other considerations make it impracticable to do so. Normally, a 6″ spacing will present no disadvantage since older facilities, on relatively short spans, will be subject to this respacing procedure.

(2) Respacing from the 12-12-12

TABLE VI: — Crosstalk Performance of Various Wire Configurations. Approximate Relative Crosstalk Performance in db Impairment with Respect to 6-30-6/24 (prs. 3-4 and 7-8) Configuration.

Configuration	Without Pole Pairs	With Pole Pairs
6-30-6/24	0	13*
6-24-6/24	—2	2
8-24-8/24	3	11
8-16-8/24	—1*	2
12-12-12/24	10*	28

*Not ordinarily used for 160 kc carrier operation but is included for comparative purposes.

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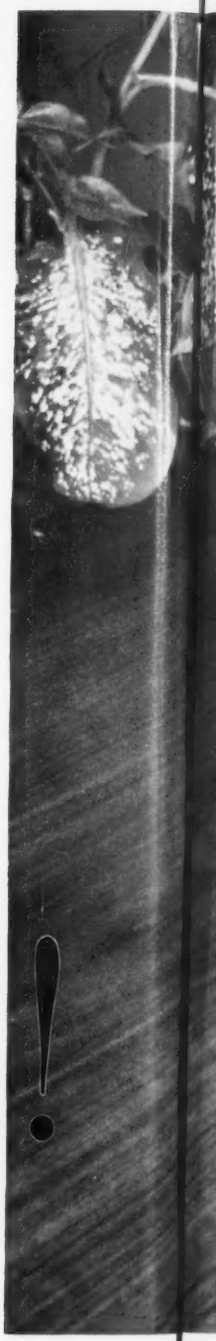

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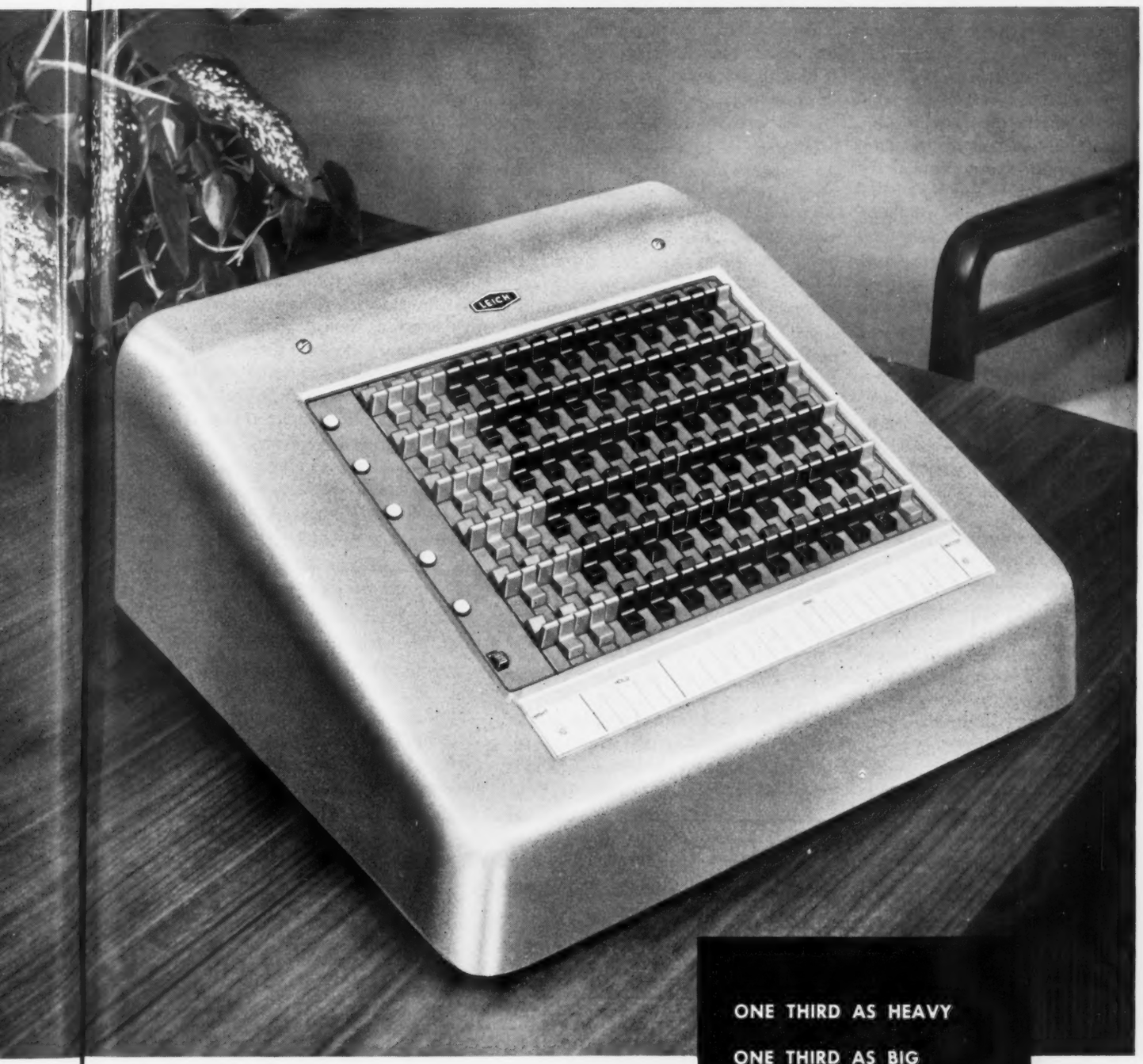

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GENERAL SYSTEM

to the 6-30-6 arrangement requires the relocation of two pins for each group of two horizontally adjacent non-pole pairs. It also will require the removal of the pole pairs on the crossarm involved, and this usually involves the provision of additional facilities to offset the loss of the pole pairs. In view of these limitations, it is usually undesirable to convert existing facilities to the 6-30-6 configuration if reasonably satisfactory crosstalk performance can be obtained more economically with other arrangements or by the use of compandors.

(3) It may be desirable to retain the nominal 12-12-12/24 configuration and to apply the O-1 or AE-150 transposition pattern. This assumes that the average span length does not exceed 165 feet and that the superimposed carrier system will be equipped with compandors.

It should be appreciated from the above that the choice of configuration in any given situation must be carefully analyzed. From the crosstalk and noise standpoint the use of 6″ spacing seems desirable, but storm loading conditions, possible high wind velocities or excessive average span lengths that may cause wire hits, may dictate 8″ spacing instead. Under other conditions the 6-24-6 or 8-24-8 spacing may be desirable.

From the foregoing discussion it will be noted that universally applicable procedures cannot be specified. Nevertheless, general guides can be given for reaching a suitable decision. In *Table Seven,* the spacings given assume that the circuits are of considerable length or that they will ultimately become so as extensions are made from time to time. In the latter case it may be desirable to employ the suggested procedures for relatively short lengths. The configuration should not, in general, be changed within a transposition section as this alters the crosstalk coupling coefficient as well as the characteristic impedance of the open-wire facilities with resulting reflection effects. These effects need only be considered when Type 45A and "J" carrier operation is involved; under other conditions they are essentially negligible.

The Phantom Circuit

EARLY IN the history of long distance telephony the practice of utilizing phantom circuits was adopted. At that time it constituted a great advance since it created a third circuit from each group of two adjacent pairs, thus increasing the circuit capacity of a line by 50% without any increase in the use of wires, insulators or crossarms. This very marked economy led to the practice, until recently, of phantoming practically all long distance circuits. Recently, under the pressure of improved crosstalk and noise requirements for modern "long distance" circuits, the phantoms have generally fallen into disfavor in comparison with the associated side circuits or other non-phantomed circuits. Also, phantom circuits in general will create certain limitations in the application of carrier systems and have other disadvantages as noted later:

(1) Phantom circuits are more susceptible to the effects of crosstalk and noise.

(2) Phantom circuits normally cannot be used on pairs that are utilized for network program transmission.

(3) Inferior crosstalk performance of the side circuits results at carrier frequencies as compared to non-phantom pairs.

(4) The general impracticability of simultaneously deriving phantom circuits when the side circuits are employed for

TABLE VII

Suggested Wire Configurations - Retransposing

Type of O.W. Pairs 10 Pin No.	Approx. Range of Freq. - Kc.	Existing Lines: New Lines	Existing Lines: New Wire on New Crossarms	Existing Lines: New Wire on Existing Crossarms	Existing Lines: Existing Wire
Non-Ph.	0 - 150	6-30-6 (8-24-8) #	6-24-6 (8-24-8)	6-24-6 (8-24-8) **	6-24-6 (8-24-8) **
Non-Ph.	0 - 35 *	6-24-6 (8-24-8)	6-24-6 (8-24-8)	Existing	Existing
Phantomed	0 - 35 *	8-16-8	8-16-8	Existing	Existing

* Or less
** Respacing may be necessary
\# The recommended crossarm separation is 36" in this case. In the other cases either the existing or 24" crossarm separation is recommended.
Consideration should also be given to the O-1 and AE-150 transposition system which will not require respacing (in the usual sense).

multi-channel carrier operation up to 150 kc.

For the reasons enumerated above it is generally undesirable at this time to create additional phantom circuits, and when more than one multi-channel carrier system is to be operated on a line, all of the pairs to be employed for such operation should be non-phantomed. It must be recognized however, that under certain conditions relatively short multi-channel carrier systems when equipped with compandors can successfully be operated on side circuits of phantom groups that are transposed for 30 kc operation. In spite of the possibility of deriving satisfactory performance under certain conditions with their use, there still will be many cases where the high grade performance demanded today can be obtained only by re-transposing or original construction of line facilities which omit the phantom circuits.

Noise, Crosstalk & Transmission Performance at Carrier Frequencies

THE VARIOUS wires on an open-wire line are subject to inductive effects due to the electric and magnetic coupling that exists, and if adequate remedial measures are not provided, excessive noise or crosstalk will result. Coupling also exists between the open-wire telephone pairs and any paralleling power lines, or other sources of induction, even including the earth's electric and magnetic fields. The various inductive effects frequently are referred to simply as "interference," which manifests itself specifically as "crosstalk," "noise" or other ways such as false telegraph signals, protector operation, etc.

The inductive effects within an open-wire line can be controlled largely by reducing the coefficients of mutual inductance and capacitance of the wires involved, by the use of the most suitable type of configuration, and by transposing the wires of the various circuits in accordance with any one of several systematic plans. Wire transposing is effected by interchanging the relative positions of the wires at short intervals of length and in accordance with various fundamental patterns.

Interchanging the position of the wires changes the phase of the induction by 180 degrees at the point of transposing and causes the induction in some of the intervals to be in phase opposition to that in others. The resulting overall net coupling can in this manner be reduced to very small magnitudes. It is not practical, owing to propagation and random combination of irregularity effects, to accomplish a complete reduction to zero.

From time to time various "systems" of transpositions or transposition patterns have been designed to cope with the new requirements and conditions that had to be met as the communication art developed. Some of the earlier systems are no longer employed, but they may still be in existence on some of the older open-wire facilities and for this reason are referred to herein.

Some of the various systems used are suitable for voice frequency operation only; others are suitable both for voice frequency and carrier frequency operation. With some of the systems involving less exacting requirements phantoms may be derived, while with others phantoming is not generally practical. Reference to systems that permit phantom operation is for information only and does not imply that these designs should be utilized for new construction or in the re-transposing of existing facilities.

Some of the transposition patterns are adapted to initial installation in new lines or existing lines that must be completely re-transposed. Others are designed to permit rearrangements and changes in existing lines as additional circuits are provided from time to time.

From the variations referred to above, it will be evident that many problems are encountered in planning open-wire facilities for the most effective and at the same time most economical carrier transmission media. These are among the reasons why careful planning and the choosing of appropriate transposition systems are extremely necessary in connection with any modern carrier communication project. Each specific project will require detailed engineering of the transposition layouts to be utilized but the more general considerations which precede such detailed engineering require a thorough knowledge of the various transpositions available, their overall characteristics and their adequacy for various types of operation. These are discussed in greater detail below.

Of the various transposition systems that are commonly used in the United States some are known as "basic" systems. This term denotes that they are designed for initial installation in connection with new line construction or where re-transposing all of the wires on existing lines is necessary. Certain other systems are termed "superposed" systems because they are designed to be utilized when some or all of the facilities on an existing line are to be retransposed, as needed, for carrier operation for which the basic system may not be suitable. It is, of course, possible to utilize a superposed system in place

TABLE VIII

Common Transposition Systems And Some Of Their Characteristics

System	Designed for: Basic or Super.	Phan. or Non-Ph.	Drop Bkt. or Point Type	Cross-arms	Non-Pole Pairs	Pole Pairs	Phantoms	Maximum Number of Non-Pole Pairs Suitable for Carrier: 10 kc	35 kc	150 kc
K8	B	Either	D	8	32	8	20	-	-	-
K8	S	Non-Ph.	P	8	32	8	4	a	32g	-
K82	S	Non-Ph.	P	6	24	6	3	a	24g	14f
J2	B	Non-Ph.	P	4	16	-	-	a	a	16
EL	B	Either	D	18	72	18	45	-	-	-
Std.	B	Either	E	4b	16b	4b	10b	-	-	-
C1	S	Phan.	D	5	20	c	c	a	20g	-
J5	S	Non-Ph.	P	4	16	d	d	a	a	16
D	S	Phan.	D	4	16	c	c	12	4g	-
AA	S	Phan.	D	4e	16e	c	c	8e	8eg	-
K10	S	Non-Ph.	P	8	32	d	d	a	32g	-
J1	S	Non-Ph.	P	4	16	d	d	a	a	16
G1	S	Non-Ph.	P	5	20	d	d	a	a	20g
AE-150	S	Non-Ph.	P	5	20	d	d	a	a	20g

a - Suitable for this frequency since the transposition arrangements are designed for a higher frequency. Use for the lower frequency may not be economical.
b - The 5th and lower crossarms are transposed like the corresponding 1st and 4th crossarms with a proportionate increase in the numbers of pairs and phantoms.
c - Same as the basic system on which it is superposed.
d - Same as the basic system on which it is superposed except for the non-phantomed pairs.
e - The 1st and 3rd crossarms are designed for 30 kc operation; the 2nd and 4th for 10 kc operation, the 4 non-pole pairs on the 5th crossarm may be transposed for 30 kc operation, thereby making a total of 12 non-pole pairs available for that purpose.
f - Some pair combinations may require the use of compandors to obtain satisfactory crosstalk performance.
g - In general these transposition patterns can be used successfully for "short haul" multi-channel systems, such as Lenkurt Type "45" and Western Electric "O" system, when these are equipped with compandors. Also when only one multi-channel system, such as Lenkurt Type 42C, 45A or W.E. Type "J" is to be placed on a route, it generally will be found feasible to utilize successfully "35 kc" transposed wires. The decision as to the suitability of the wires in these instances can only be determined by transmission-frequency tests, and in some instances noise tests and cross-talk test.

EL - Exposed line pattern

AA - Alternate Arm pattern

Parts of this data are derived from Bell System or AAR sources.

of a basic system when so desired. The more common systems utilized together with various other details of their design are summarized in *Table VIII*.

Various other transposition systems have been employed from time to time, however, these are no longer recommended except in situations where their continued use is required when placing additional wire on these lines. It will be desirable to substitute the C1, O-1 or AE-150 pattern. All of the circuits (and phantoms) referred to in the above tabulation are suitable for voice-frequency telephone operation as well as for carrier operation as indicated.

In considering the transposition arrangements to be employed, pole-spacing is important. In the case of existing lines having other than optimum span lengths, it is usually necessary to employ "floating" transposition brackets (or set extra poles with a consequent increase in cost). Transposition sections are necessarily designed for various maximum lengths that should not be increased materially or their effectiveness will be impaired.

The foregoing comments indicate the several transposition designs available for use in open-wire circuits and indicate the general field of application; however, each particular project will require detailed consideration as to the specific arrangement to be employed.

The discussion that follows will serve as a general guide preceding the detailed design of new modern open-wire facilities.

The more popular *basic transposition systems* are tabulated in *Table IX*, together with their general field of application.

TABLE IX

BASIC TRANSPOSITION SYSTEMS AND THEIR FIELD OF APPLICATION

Type of System	Field of Use
K8	Present standard for phantomed or non-phantomed voice facilities on existing lines. If carrier requirements are likely to materialize within a year or two the C1, AE-150 or the O-1 systems might be installed initially to minimize subsequent changes.
Exposed Line	Designed for phantomed or non-phantomed voice operation. Limited to voice frequency additions on existing lines already transposed to this system.
J2	Designed for high-grade non-phantomed Type "J" carrier operation. Employed for new lines on which a large majority of the open wire pairs are to be used for such operation either initially or within the near future. Alternative use of J5 superposed system would give satisfactory crosstalk performance with compandors and effect economies in transposition pole spacing.

The particular *superposed transposition* system to be employed will depend upon the basic system to which the line is transposed, any existing superposed arrangements, and the range of frequencies to be transmitted on the circuits that are to be utilized. It is also assumed that compandors will be used if needed. It is recognized that many situations will be encountered in the open-wire plant for which it will be impractical to outline adequate procedures that will be applicable in all cases. The summary given in *Table X* should however be helpful in typical cases.

It must be recognized, of course, that conversion from one transposition system to another and the superimposing of carrier frequency transposition arrangements on the basic voice-frequency system may require more or less extensive changes in the non-carrier as well as in the carrier facilities. The specific changes required will depend upon the particular facilities involved and, of course, will require detailed consideration of this matter before final plans are adopted.—*To Be Continued in the December issue of* TELEPHONE ENGINEER & MANAGEMENT.

TABLE X

Procedure For Installation Of Carrier Facilities

Basic System	Superposed System Previously Installed	Carrier Prs. to be Ph. or Non-Ph.	Max. Nominal Carrier Freq. kc	Typical Procedure for Carrier Facilities
K8	None	Ph.	35	Install C1.
K8	None	Non-Ph.	35	Install K82.
K8	None	Non-Ph.	150	Install O-1 or AE-150 and use compandors.
K8	K8	Non-Ph.	35	Continue with superposed K8.
K8	K8	Non-Ph.	150	Convert to K82 if it meets ultimate requirements; otherwise convert to O-1 or AE-150.
Ex. Line or Std.	None	Ph.	35	Install C1.
"	None	Non-Ph.	150	Install O-1 or AE-150 and use compandors.
"	D	Ph.	35	Continue with D if it meets with ultimate requirements; otherwise convert to C1. Conversion requires major changes.
"	D	Non-Ph.	150	Convert to O-1 or AE-150. Requires major changes.
"	AA	Ph.	35	Continue with Alternate Arm if it meets ultimate requirements; otherwise convert to C1. Conversion requires major changes on 2nd & 4th crossarm.
Ex. Line or Std.	AA	Non-Ph.	150	Convert to O-1 or AE-150 and use compandors.
"	C1	Non-Ph.	150	Convert to O-1 or AE-150 and use compandors.
"	K10	Non-Ph.	35	Continue with K10.
"	K10	Non-Ph.	150	Convert to O-1 or AE-150. Conversion requires major changes.
"	J1	Non-Ph.	150	Continue with J1.
"	J5	Non-Ph.	150	Continue with J5.

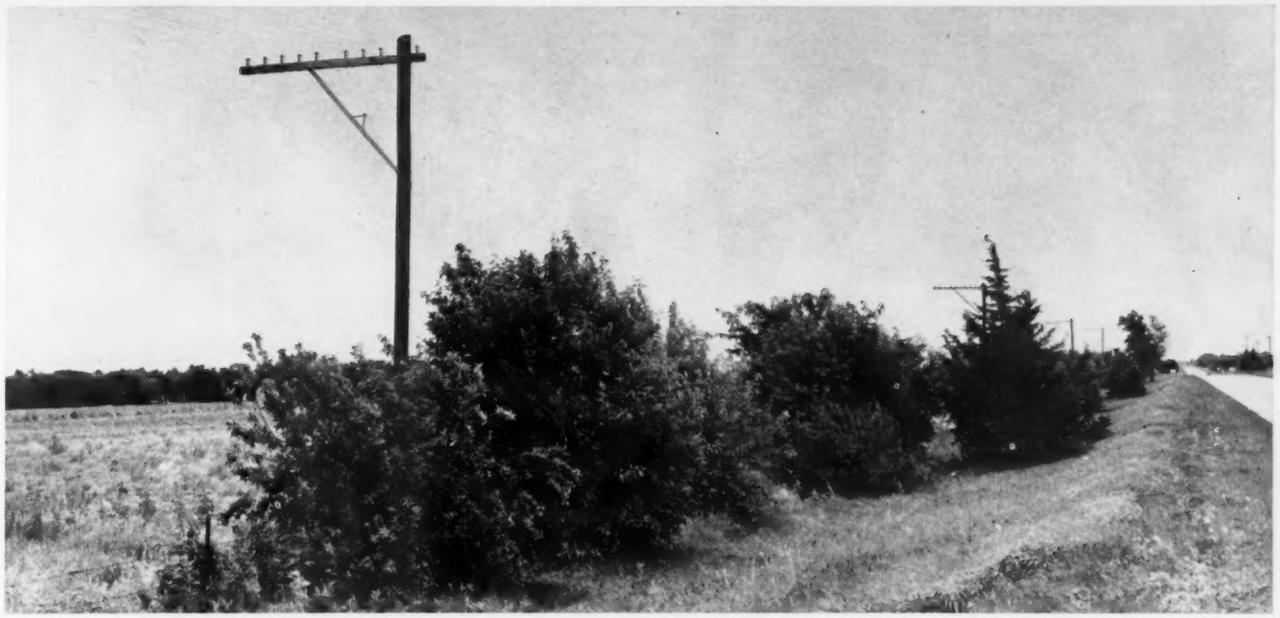
Safety Council Issues Book on "Accident Facts"

THE 1954 EDITION of the National Safety Council's statistical yearbook, "Accident Facts," is now off the press. The book contains facts and figures on all types of accidents — industrial, traffic, home, farm and school.

Twenty pages of the book are devoted exclusively to occupational accidents and provide the factual background necessary to give direction to an industrial safety program. There is a detailed list of accident rates by major industry groups, as well as charts showing the accident trend during the past 25 years.

The 96-page book is an invaluable source of ideas and data for making speeches, writing articles, preparing reports and planning safety campaigns.

"Accident Facts" is priced at $.75 a single copy and less for quantities. Inquiries should be sent to the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.



"Maintenance of proper clearances should never be neglected."

Measuring Cable and Wire Clearances

By JOHN S. REED

HERE'S HOW to maintain adequate clearances for telephone lines. In his final installment, the author discusses measuring ground clearances.

Causes of Inadequate Clearances

PLANT MEN are familiar with the causes of insufficient wire clearances. Open wires may tend to have excessive sags in hot weather or as the result of ice loads increasing the permanent set in the line conductors (particularly in the case of copper and old type BB steel wire). Sometimes a slipped guy or a broken pole butt may throw slack into one or more spans of open wire and reduce the clearance under these spans. Drop wires are particularly troublesome if they have not been installed with due regard for proper clearances at road crossings. Sometimes they may slip in the drop wire clamp or the clamp bail may wear through at the wire support (due to excessively tight span subjected to constant movement in crosswinds), allowing the drop to hang from the next attachment and increase the wire sag.

Another cause of reduced line clearance is the building up of dirt or graveled roads by grading crews. Particularly in areas of heavy snowfalls, county authorities have established the practice of deepening roadside ditches and building up the road to reduce snow accumulations on the road. The high road crown enables the snow to blow off into the ditches and thus leaves the road relatively clear. This procedure reduces snow clearance work for county crews but presents the problem of raising the wires to obtain the required heights over the roads at the crossing points.

Insufficient clearances of telephone wires over a road may result in a damage claim in case the wires entangle in a hay rack or other high equipment passing under and equipment damage or personal injury results.

In the case of inadequate clearances of telephone lines from power wires, the cause may be improper installation of the telephone or power wires and associated guys and pole hardware, or sagging of the power wires down upon the telephone facilities as the result of slipped power guys or broken pole.

Measuring Ground Clearances for Telephone Lines

A NUMBER of methods of measuring overhead wire heights are in use. The simplest one employs a cloth tape line with a light weight attached to the free end which is thrown over one wire (the lower one in bracket leads) as illustrated in *Figure* 7. The weighted end is drawn up until it meets the wire and the reading taken of the tape at the ground line.

Another method employs a sec-

Just what you

Here's the telephone you've been waiting for, hoping for! Type 80 gives you all the things you've always wanted in a telephone — the things that avoid trouble, save money, please subscribers, and build business. It gives you the things you *asked for*:

"Better Transmission on Long Lines"

Transmission network and new transmitter and receiver especially designed to give the high gain and clarity needed on the long, heavily-loaded lines typical of Independent areas. New induction coil and network substantially improve anti-sidetone balance. Line current adjustment insures best response on all lengths of lines.

"Simplified Maintenance — and less of it"

Components are grouped in convenient assemblies which can easily be replaced, using only a screwdriver (ringer and ringing condenser, for example, are mounted as a unit). All connections are made with handy spade terminals — no soldering. Moisture-sealed balancing network, twin contacts on hookswitch and dial, sturdy reinforced housing, long-wearing cord, and overall rugged construction keep maintenance 'way, 'way down.

"Easier, Surer dialing"

Dial mounted at best angle for all-around visibility. Fingerplate lower on outer edge so numbers can be seen easily from any position. Arrowheads *guide the eye* from fingerplate holes to numbers — make dialing easier, help avoid errors. Uniform impulsing makes dialing *surer*, even on longest lines.

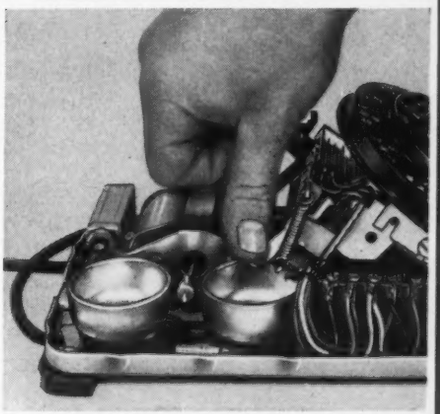
"Improved ringers, better ringing"

You'll find a considerably increased volume of sound on the higher ringing frequencies, and gong pitch is selected so ring carries well at all frequencies. Volume control is optional on straight-line ringer. Prove to yourself Type 80 is today's best buy! See handy ordering information in Circular 1841, and order now. (Find Circular 1841 inserted in your Oct. 15th *Telephone Engineer & Management*—or write for a copy today.)

A TYPE 80 EXCLUSIVE!
Contours of housing and contours and balance of handset so arranged that handset cannot be hung up except in the cradle. Practically eliminates "off-hook" troubles — saves expense.

Try it... *and...* *see!*

THE "INSTALLER'S HOOKLOCK"— ANOTHER TYPE 80 EXCLUSIVE!
Saves installation time. Installer removes housing, pushes hookswitch down. Hookswitch stays down until housing is replaced, then restores automatically. Leaves your man free to use both hands — helps him get done in a hurry. Avoids losing calls during installation or maintenance.



ou ASKED FOR!

We went out and talked to many typical telephone men to find out what they wanted in a telephone. The result was Type 80—the most practical telephone ever—"the telephone YOU designed."

BETTER TRANSMISSION IN INDEPENDENT AREAS!
New short handset, new balancing network, new transmitter and receiver capsules designed to provide high effective transmission, especially on long, heavily-loaded, typical Independent lines.

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . Machine Switching Automatic Dial Systems

Makers of Telephone, Signaling and Communication Apparatus • Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions: AUTOMATIC ELECTRIC SALES CORPORATION
Export Distributors: International Automatic Electric Corporation
1033 West Van Buren Street, Chicago 7, U. S. A.

FIGURE SEVEN: — Using cloth tape with weighted end to measure clearance of an overhead guy crossing a road intersection.

tional wooden rod as indicated in *Figures* 8 *and* 9. Each section of the measuring rod is three feet long and is marked off in feet. The overall length is 24 feet, which is sufficient for measuring practically any height. When used to measure heights of wire or cable spans over railroad tracks, the rod is raised until it touches the lowest wire. The distance between the bottom of the rod and the top of the track rail is added to the length of the rod to determine the overall height. Clearance measuring rods are also made in six-foot lengths for carrying in trucks.

Since clearance measuring rods are rather expensive for general distribution to combinationmen and installers and are not very convenient for measuring heights of drop wires being placed, a clearance measuring line is employed for measuring drop wire heights.

FIGURE EIGHT: — Clearance measuring rods and canvas carrying case. These rod sections are 3 feet long and are fitted together by means of brass ferrules.

FIGURE NINE: — Using the wood clearance measuring rod. This 18-foot stick indicates there is ample clearance for the drop wire crossing the road.

As shown in *Figure* 10, this device consists of a notched rubber bobbin with a length of cord attached to one end of the bobbin. The other end is tied to a special spring clip which is a modified form of a standard No. 27 universal clip with the serrated jaws ground smooth. This clip is used to attach the measuring line to the drop wire before it is pulled up to its attachment. The method of using the measuring line when installing a drop is shown in Figure 11. Since the line is 18 feet long, it provides a very effective check on the height of the drop wire being strung across the road. After attaching the drop wire, the installer needs only to climb down and pull slowly on the clearance line until the clip slips off the wire and falls to the ground. The bobbin can then be picked up and the line wrapped back on it for return to a storage compartment in the truck.

EDITOR'S NOTE

Part One of this article appeared in the September 1954 issue of "Telephone Engineer & Management."

For measuring the height of an existing drop span, the clearance line is used in a different manner as illustrated in *Figure* 12. The line is unwound from the bobbin and the latter is tossed up in the air from one side of the span to fall across the wire. The bobbin is drawn up until it meets the wire. The height of the clip above the ground then indicates the amount of excess clearance. If it rests with part of the measuring line on the ground, the clearance is insufficient and the drop span must

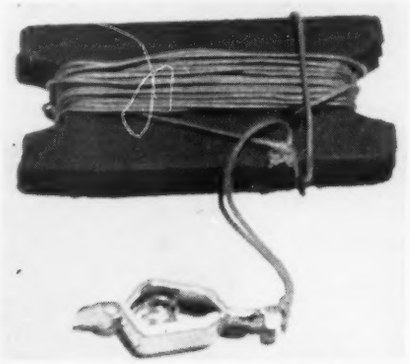


FIGURE 10: — Clearance measuring line on rubber bobbin. The spring clip has smooth jaws to enable the line to be pulled free after the drop span is raised into position.

FIGURE 11: — Combinationman using the clearance measuring line to check height of a drop span being put up.

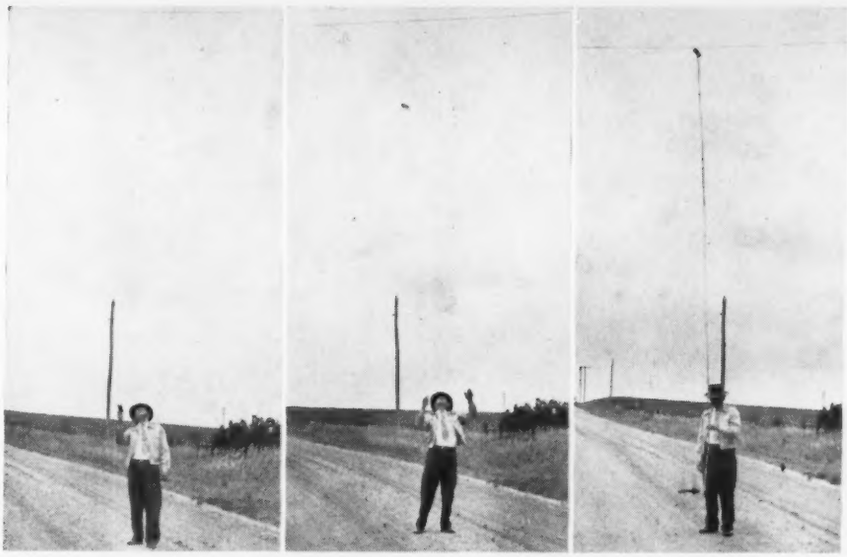


FIGURE 12: — Checking clearance of an existing drop span with clearance measuring line. Left—All set to throw. Center—Tossing the bobbin over the span. Right—Bobbin has been pulled up to the wire and height of spring clip above the road surface indicates amount of excess clearance.

FIGURE 13: — Pole top extension fixtures are an economical means of obtaining needed clearances over road ways in rural areas.

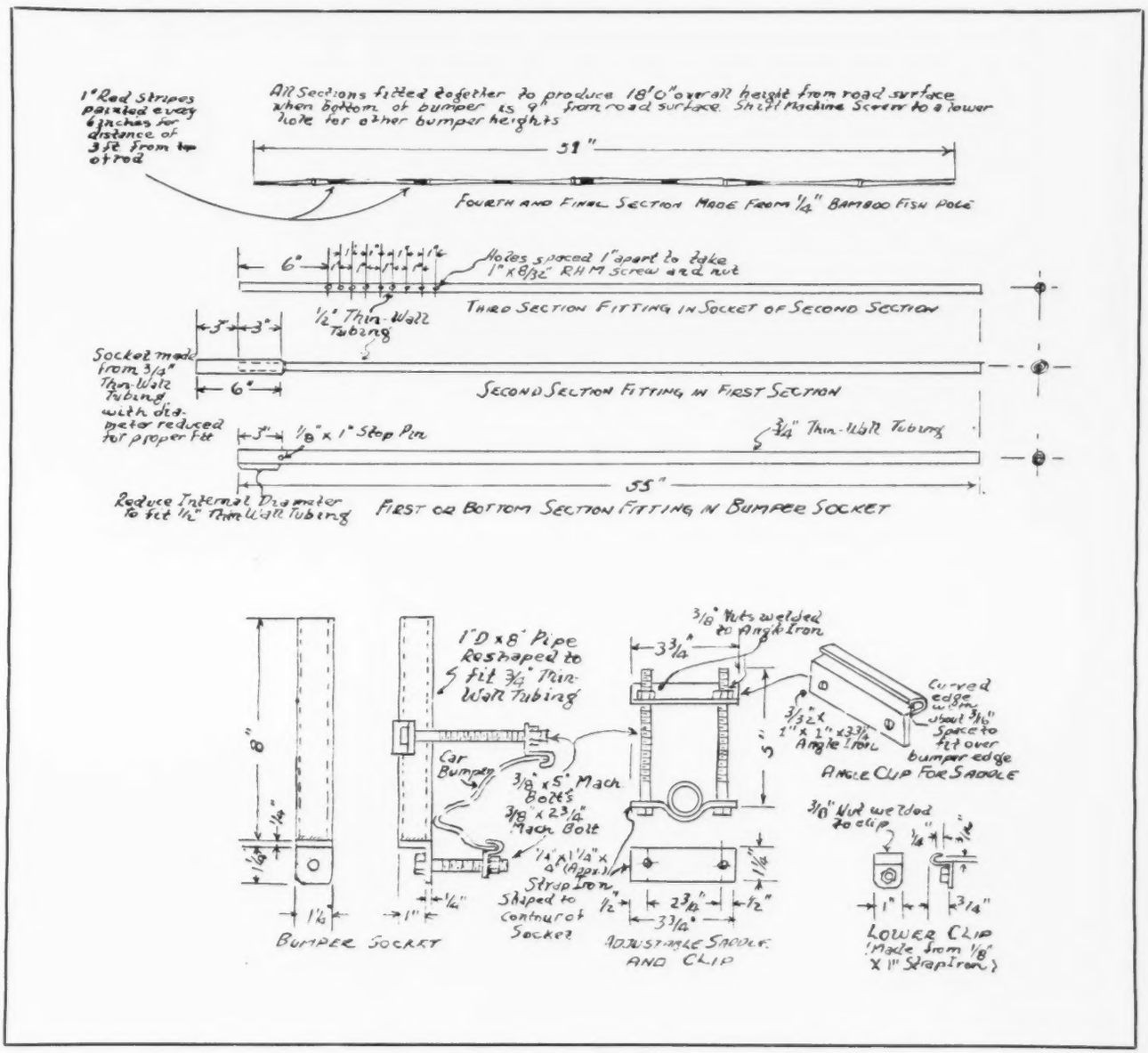

1" Red Stripes painted every 6 inches for distance of 3 ft from top of rod
All Sections fitted together to produce 18'0" overall height from road surface when bottom of bumper is 9" from road surface. Shift Machine Screw to a lower hole for other bumper heights
31"
FOURTH AND FINAL SECTION MADE FROM 1/4" BAMBOO FISH POLE
6"
Holes spaced 1" apart to take 1" x 8/32" RHM screw and nut
1/2" Thin-Wall Tubing
THIRD SECTION FITTING IN SOCKET OF SECOND SECTION
3"
3"
Socket made from 3/4" Thin-Wall Tubing, with diameter reduced for proper fit
6"
SECOND SECTION FITTING IN FIRST SECTION
3"
1/8" x 1" Stop Pin
3/4" Thin-Wall Tubing
55"
Reduce Internal Diameter to fit 1/2" Thin-Wall Tubing
FIRST OR BOTTOM SECTION FITTING IN BUMPER SOCKET
8"
1/4"
1 1/4"
1 1/4"
1"
BUMPER SOCKET
1"D x 8" Pipe Reshaped to fit 3/4" Thin-Wall Tubing
Car Bumper
3/8" x 5" Mach Bolts
3/8" x 2 3/4" Mach Bolt
1/4" x 1 1/2" x 4" (Approx.) Strap Iron Shaped to contour of Socket
1/4"
3/8" Nuts welded to Angle Iron
3 3/4"
3 3/4"
1/2"
2 3/4"
1/2"
ADJUSTABLE SADDLE AND CLIP
Curved edge with about 3/16" Space to fit over bumper edge
3/32" x 1" x 1" x 3 3/4" Angle Iron
ANGLE CLIP FOR SADDLE
3/8" Nut welded to clip
1/4"
1/2"
1"
3/4"
LOWER CLIP (Made from 1/8" x 1" Strap Iron)

FIGURE 14: — Construction details of mobile clearance measuring rod.

FIGURE 15: — Using the mobile clearance measuring rod for checking height of cable span across road. In this case the cable was barely 18 feet above the road.

FIGURE 16: — Markers on the flexible tip of the mobile clearance rod shows the open wires are 12 inches too low.

be raised to the point where the clip comes off the road surface.

Usually when a drop span across a highway or county road is found to be too high, the most satisfactory remedy is to place a pole top extension fixture as indicated in *Figure* 13.

Mobile Clearance Measuring Rod

WHEN A general inspection is required to check heights of telephone wires passing over roads, the use of the regular clearance measuring rods would result in a time consuming task. A middlewestern company has developed a mobile type clearance measuring rod for use on line inspector's cars. Constructional details of this instrument are shown in *Figure* 14.

To use the mobile rod, the universal socket is attached to the car bumper on the left side, so the driver can see the top of the rod by looking out of the car on his side. The rod sections are assembled together to obtain the desired 18 foot height from the ground to the top of the rod and inserted in the socket. The car is then driven at normal speed along the road. When a telephone drop, open wire, or cable is seen crossing the road, the driver slows down gradually until the rod is close to the span as indicated in *Figures* 15 *to* 17. If the rod does not touch the wire, the inspector drives on to the next crossing span to repeat the procedure.

If the top of the rod comes in contact with the span, the inspector notes down the location of the low span and indicates the amount the wire must be raised to obtain the needed clearance. The red stripes in the top portion of the rod will indicate the height by which the wire is too low.

The use of a flexible bamboo rod for the top portion protects the line wires from damage and prevents the possibility of bending the light tubing at the socket. It is not satisfactory to use a light rod assembly since it will whip around too much in driving and will not remain straight. The combination of stiff tubing for the lower part and a flexible bamboo rod at the top has been found to be most satisfactory for the purpose. If the rod is broken in service, it can be readily replaced by using the top section of a light bamboo fishing pole.

Measuring Clearances Between Telephone and Supply Lines

IT WOULD be difficult and dangerous to measure separations between telephone and supply lines at crossings and in joint construction with tape line or measuring stick. Generally, at the time of construction the minimum clearances are determined for the crossing situation or joint construction and every effort is made to provide greater than the

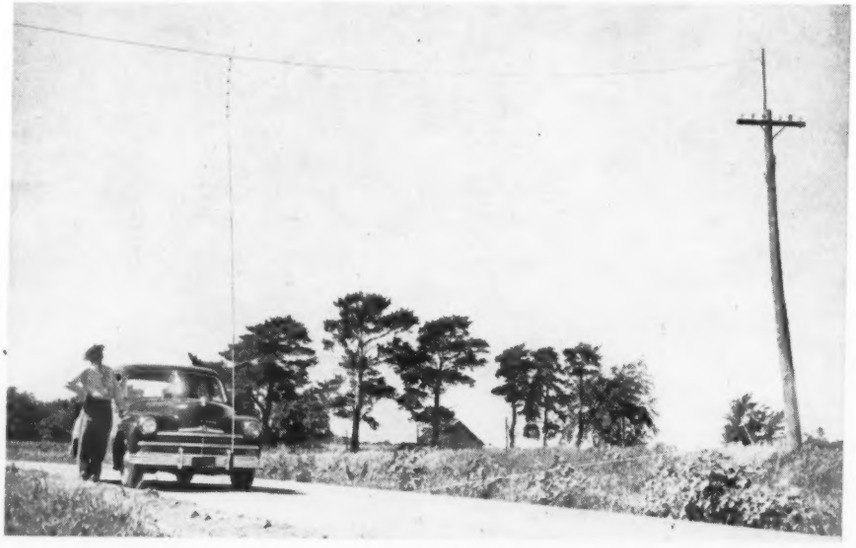


FIGURE 17: — In spite of the pole top extension fixture, the drop span was found to be too low by almost 6 inches. This condition was corrected by setting a taller drop pole at the other end of the drop span.

minimum separations by at least one foot.

To make sure that weather conditions and deterioration of poles and fixtures and supporting equipment have not caused reductions in clearances between telephone and power wires, these clearances are checked at intervals. Visual inspection however, cannot always be relied upon to detect reductions in the clearances. For greater accuracy, it is possible to use a range finder to measure the difference between the levels of the supply and telephone facilities.

For best results, an accurate type of range finder with at least 6-inch sighting base and capable of measuring distances of up to 100 feet is needed. The use of an ordinary range finder would require throwing ones head up to sight on the wires above. The range finder illustrated in *Figure* 18 meets this objection by the provision of an erecting prism which enables the observer to look in a horizontal direction to sight the overhead wires as indicated in *Figure* 19.

The range finder is a precision instrument with a 6-inch base for measuring distances from 8 feet to 100 feet with an accuracy of 2 percent. Its operation depends on the principle of triangulation. The observer stands under the wires and holds the range finder at eye level, centering the field on one of the wires in the lower level. He sees two images of the object, one white and the other gold. Turning a knurled knob in either direction causes the white image to move. When this image is clearly superimposed on the gold image, the range finder is in alignment. The height of the wire above the eye level of the observer is indicated by the position of the dial opposite the marker. The height of one of the wires at the higher level is measured in the same way. The difference between the two heights is the amount of separation between the two wire levels. The procedure is illustrated in *Figure* 19.

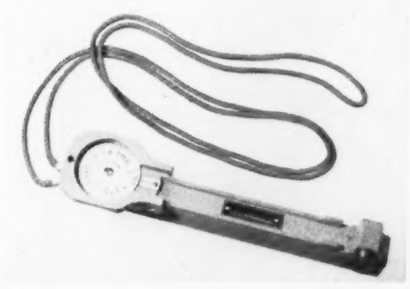


FIGURE 18: — The Meyer-Opticraft range finder with erecting prism (Model FRF-2) is especially designed for measuring heights of wires and determining distances between two wire levels at a crossing point or in joint construction. The two field apertures are on the other side of the finder housing from the eyepiece. The erecting prism makes it unnecessary to throw the head back to focus on the overhead wires.

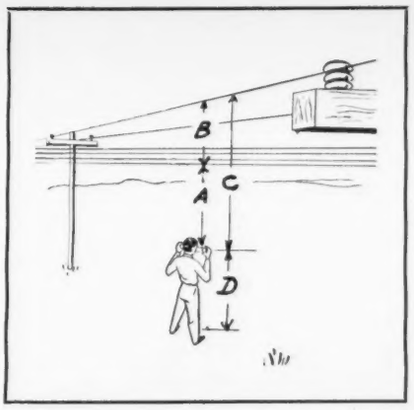


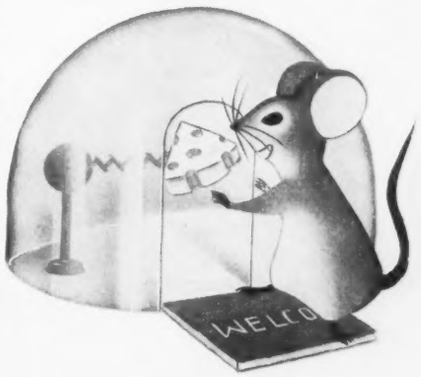
FIGURE 19: — Using the Meyer-Opticraft range finder. Readings are taken from the knob setting to obtain values A and C. The distance B between the crossing wires equals C — A. Ground clearance for the overhead telephone wires equals A + D. D. is the eye-level height of observer.

The height of the lowest wires above the ground plus the height to the eye level of the observer gives the clearance of the wires above the ground. To minimize errors of observation, several readings should be taken and the results averaged.

Conclusion

IN THE discussion of separations for telephone and supply wires in joint construction, it will be noted that supply voltages up to 50,000 volts were specified. Ordinarily, in urban areas, it is the practice to limit joint construction to supply distribution lines of 5000 volts or less Span lengths generally to not exceed 150 feet in this construction. However, as supply and telephone lines were extended into rural territory, joint construction raised the problem of higher supply voltages and longer spans. Rules in the National Electrical Safety Code provide for these increased voltages and longer spans. It should be understood though, that special protectors and drainage units are needed on account of the exposure to high voltages and the higher susceptivity of the telephone circuits to induction from the power lines.—THE END. (*Part One of this article appeared in the Sept. issue.*)

We've Built a Better Mousetrap



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THE BATTERY CHARGER WITH NO MOVING PARTS *

Model 1200B

And telephone men are beating a path to our door.

They've found that FLOTROL does what they always hoped their battery charger rea'ly would do; IT HOLDS CONSTANT FLOATING VOLTAGE on the battery.

They've found, too, what it can mean to have a charger which doesn't require attention, one they can depend on to do its job, year in and year out, without costly and annoying routine maintenance or adjustment.

For complete information, write for Bulletin 160, which describes the single-phase models, from 1/2 ampere to 24 amperes, and Bulletin 161 which covers three-phase models from 25 amperes to 200 amperes.

* *No good on mice.*

LORAIN PRODUCTS CORPORATION
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FLOTROL SUB-CYCLE

IT WAS DIFFERENT WITH THE PILGRIMS

Today, family plans for Thanksgiving and other holidays are made swiftly over the telephone. That means business for all of America's telephone companies.

The advertisement on the opposite page is a seasonable reminder that someone, near or far, would welcome a telephone call right now. November magazines will carry this holiday message to millions, reaching the territories of all of the nation's 5100 telephone companies.

"You're all Invited for Thanksgiving"

In just a little while, all America will be sitting down to its Thanksgiving dinner.

There will be grandpa and grandma and mother and father and the kids. A big, golden-brown turkey with all the fixin's. And words of gratitude for the many blessings the year has brought.

At Thanksgiving, as on so many other occasions, it's the telephone that brings the family together. It carries the welcome invitation to "come to dinner" and helps to get everything arranged.

Someone, somewhere—close to home or far away—would enjoy hearing your voice by telephone today.

BELL TELEPHONE SYSTEM LOCAL *to serve the community.* NATIONWIDE *to serve the nation.*

tips from the feild

How To-Do-It Suggestion

Fig. 1 — Telescoping trip auger.—(Courtesy of "Chance Tips.")

HERE IS the latest information on — (1) a telescoping trip auger; (2) portable gasoline powered generators; (3) selecting sites for outdoor booths; and, (4) locating opens in cable pairs.

Collected by **JOHN G. REYNOLDS**

Telescoping Trip Auger

AN EFFICIENT, economical tool for boring holes for poles and guy anchors is illustrated by *Fig. One.* In operation, the telescoping auger cuts deeply into the ground with every twist of the handle. The trip mechanism on the handle operates a movable blade which opens quickly to dump dirt. After the dirt has been released, the blade closes and locks automatically.

Portable Generators Provide Emergency Power

PORTABLE GASOLINE-powered generators provide emergency power — even during utility line failures — at Northwestern Bell Telephone Co. exchanges, Minneapolis, Minn.

Each exchange is equipped with a type AR, 3-wire, 4-pole, 60-ampere Arktite receptacle. Similar receptacles are fastened to each portable power unit. Whenever emergency power is required, one of these portable generators is towed to the stricken exchange, where a heavy cable, equipped with Arktite plugs of the same capacity as the receptacles, is used to connect the power unit receptacle to the exchange building receptacle, located conveniently on the building's outer wall.

Standardization of this emergency set-up by Northwestern Bell and Independent telephone companies in the Minneapolis area permits, as long as highways are passable, an exchange of power units, which, in turn, provide for uninterrupted service for the area's telephone subscribers.

Selecting Sites for Outdoor Booths

ACCORDING to *Southern Bell,* the question presently bothering its Alabama sales organizations responsible for locating outdoor telephones is: How many outdoor telephones in how many locations will it take to satisfy the demand for service?

No one will even guess at the answer.

There is clear-cut evidence, claims Southern Bell, of

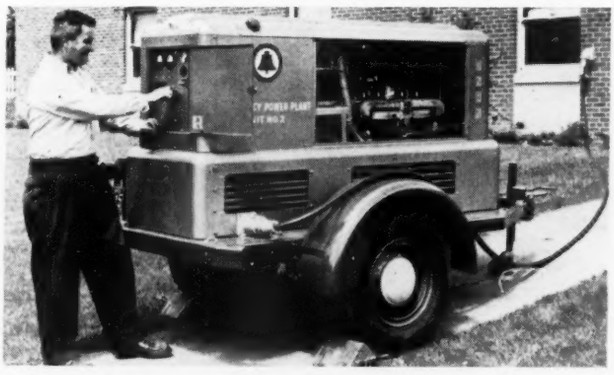

Fig. 2 — Arktite plugs and receptacles permit fast hookup of portable generator to provide emergency power.—(Courtesy, Crouse-Hinds Co., Syracuse, N. Y.)

public preference for the outdoor variety of public telephones. For every three persons who use an indoor public telephone, there are four who step into a brightly painted outdoor booth when they want to call, and those four aren't just ex-indoor public telephone users. They're new customers. Revenue records show that the installation of new outdoor booths in a neighborhood has no effect on the number of calls from indoor public telephones.

Convenience and accessibility at all hours contribute to outdoor telephone popularity. Or put it this way: Make it easy for people to telephone and they will; make it even easier, and they will use an outdoor telephone oftener. All of which makes outdoor public telephones an important revenue source.

In every Southern Bell district there are a dozen stories about how "making it easier to call" is reflected in the use of an outdoor telephone. For example, in Birmingham a booth was first located at the rear of a service station lot. People found it and placed their calls. But when the telephone was moved up near the sidewalk and a bus stop, the number of calls zoomed.

Another case in point is an outdoor booth at a Montgomery bus stop. It was only 20 steps from the bus stop and around the corner to the telephone. Then the booth was moved so that it faced the commuters as they got off the bus. Twice as many patrons use the telephone in the new location as before.

There's something about the sight of a telephone that prompts people to make calls, the sales people in Decatur, Ala., decided. An outdoor booth on the streets of Decatur and Cullman in clear view of motorists and pedestrians gets more than one and a half times the use of an outdoor booth tucked behind a service station.

Color makes a difference, too, the Tuscaloosa, Ala., district is convinced. They think distinctive colors remind people to make telephone calls or at least help them locate an outdoor booth.

How many booths does it take to serve a location? The Anniston, Ala., district will tell you you can't always be sure. There's a location on a street where daytime traffic wasn't heavy. One outdoor booth was cautiously installed. The use was startling, and another booth was added. Just as many calls are placed from either of the two booths today as there were from the first one. You'd never know it in the daytime, but the street bulges with truck traffic at night and in the early morning when only outdoor telephones are available.

Usually when it comes to selecting convenient outdoor telephone sites, the sales people can lean on studies of motor and foot traffic, and their own observations. Quite a number of busy outdoor telephones have been placed because a salesman's wife said something like this at the dinner table: "You know, I wanted to make a call when I was downtown today, and I couldn't find a public telephone anywhere. Why don't you have one . . .?"

Location tips come also from the architects and builders service, coin collectors, plant men and all connected with coin telephone development.

Alabama has a large motor vehicle registration. It's natural that service stations should rate first on the list of outdoor telephone locations. Other places where cars can park or you'd be likely to stop — such as drive-in restaurants, drive-in theatres, drive-in banks, parking lots, super markets and motels — have a high percentage and potential of the outdoor telephone total. These property owners provide suitable booth space, lighting and janitor service, and, in return receive 15 per cent of the booth revenue.

Just about anywhere people wait for public transportation or pass on foot, rates as a convenient outdoor telephone location. In developed business areas, merchants are understandably reluctant to give up sales or display space. Recessed booths in store fronts are one answer.

Outdoor telephones are planned primarily for people on the move. They're located at airports, bus stops, service stations. These are all places where they serve transient users. Though you wouldn't expect it, each outdoor telephone builds a regular clientele of users just as do indoor public telephones. "Some guys stop here every day and use the telephone," service station attendants declare.

Locating Opens in Cable Pairs

MR. R. S. DILLON, Cable Supervisor of Juneau & Douglas Telephone Co., Juneau, Alaska, describes a method of locating an open in a cable pair that he has successfully employed through his many years of service with Bell Telephone operating companies and his present company. Mr. Dillon states that the system he uses is very simple and has consistently located opens within a few inches of the computed location.

The equipment used consists of a portable wheatstone bridge, a 76-C test set or any fault finding tone set, a head receiver (such as No. 528 type), and a plumb line (to aid in measuring along aerial cable).

The apparatus is connected as shown in *Figure* 5. The location is obtained by direct comparison of the open side of the pair to the good side. This method

The Matthews adjustable reel (shown below) has a dual purpose — for both paying out and taking up conductors. The five arms adjust to fit coils of wire 14" to 21" inside diameters.—(Photo, courtesy of "Chance Tips.")

assumes that the two wires have uniform capacitance to ground.

An exact measurement of the length of cable "Dg" is necessary. A more accurate location of the open may be made, especially on cables longer than one or two thousand feet by repeating the test from the opposite end of the cable and computing the location by one of the following formulae:

$$Dx = \frac{R1 \times Dg}{R1 + R2} \quad \text{or} \quad Dy = \frac{R2 \times Dg}{R1 + R2}$$

Where:

Dx = Length of fault wire from test set to open from "x" end.

Dy = Length of faulty wire from test set to open from "y" end.

R1 = Reading of bridge at "x" end.

R2 = Reading of bridge at "y" end.

Dg = Length of cable or good wire.

Example:

Dg = 1,500 feet of cable

R1 = 81 ohms

R2 = 890 ohms

$$Dx = \frac{81 \times 1500}{81 + 890} = 125 \text{ ft. (from "x" end)}$$

$$Dy = \frac{890 \times 1500}{81 + 890} = 1375 \text{ ft. (from "y" end)}$$

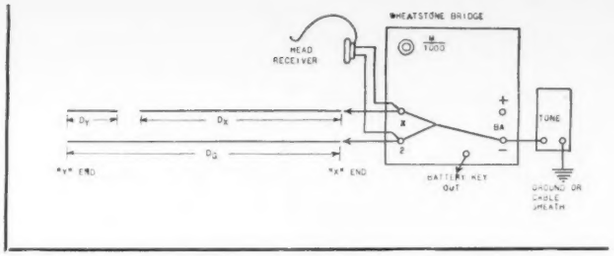

FIGURE FIVE:—Diagram of wheatstone bridge conection for accurate method of locating opens in cable pairs.

Dg = 125 + 1375 = 1500 ft.

The following case histories show the value of this method:

Case No. 1140 — Cable Sappinton #1

Fx box on toll pole — 636 Lemay Ferry Road

Length of cable — 3,555 ft.

First reading puts open with 76.2 ft. from Fx box.

R1 = 2; R2 = 840

$$Dx = \frac{2 \times 76' 2''}{2 + 840} = 10' 8'' \text{ out to open}$$

$$Dy = \frac{840 \times 76' 2''}{2 + 840} = 65' 4'' \text{ back to open}$$

Time: 2 hours — two openings — one man.

Remarks: Right on the nose.

Case #950 — Cable #1005

Fx Box — 715 Gravois Ave.

Length of cable — 500 feet

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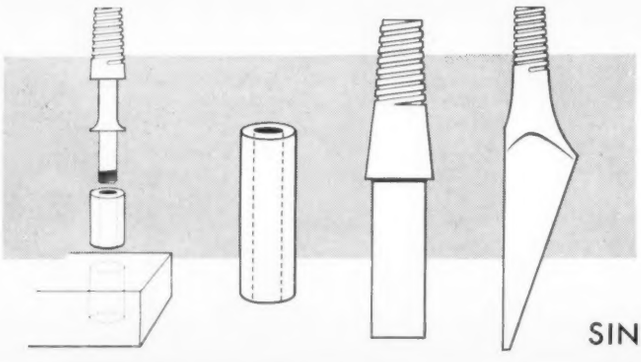
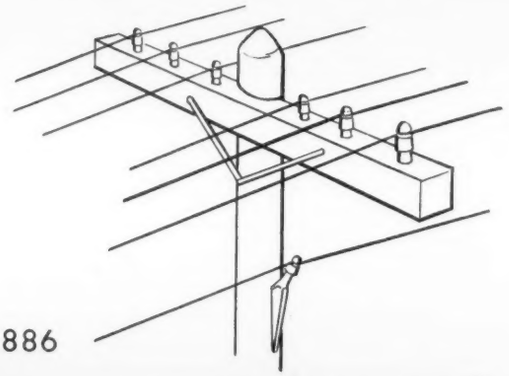
OAK BRACKETS-BUSHINGS-POLE STEPS

STANDARD SIZES OR TO YOUR SPECIFICATIONS - REA *approved*





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L. H. WIEBEL, INC.

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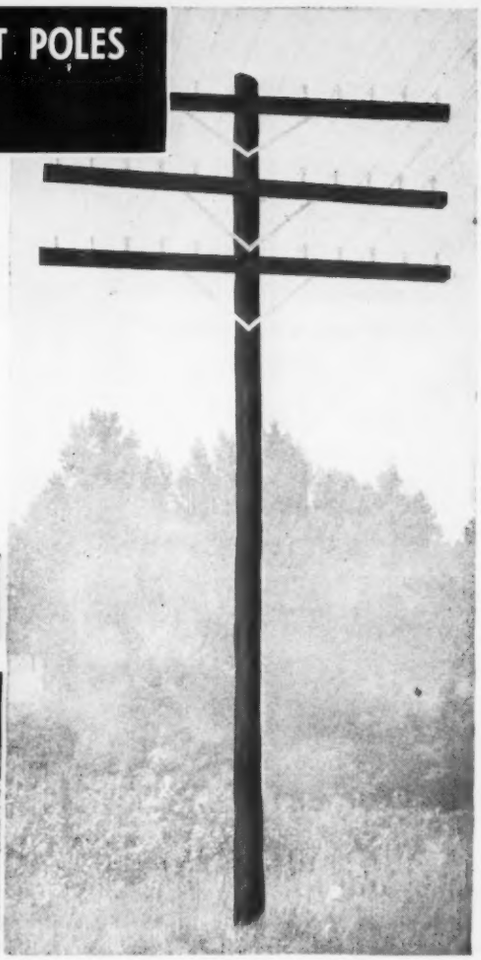
CONTINUAL RESEARCH MAKES TAYLOR-COLQUITT POLES INCREASINGLY BETTER



Below are shown two pilot treating cylinders in the Taylor-Colquitt research laboratories. One is six while the other is 26 feet long.

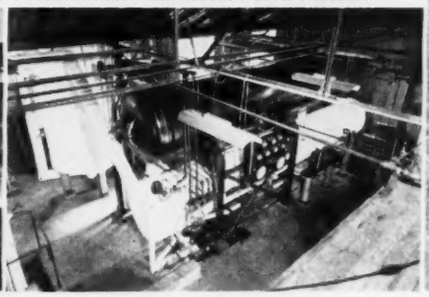
Manned by graduate technologists, these cylinders in conjunction with a large amount of special laboratory apparatus, are used not only to aid in the control of Taylor-Colquitt production operations but also to develop new and better wood preserving techniques.

Continual research with this equipment means increasingly better products—increasingly greater values for the ever growing list of telephone companies that specify Taylor-Colquitt poles.

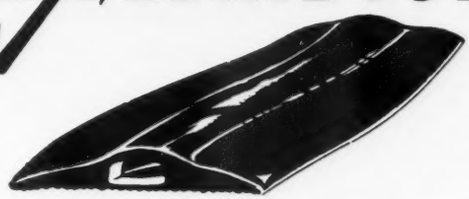
Taylor-Colquitt poles are distributed to independent telephone companies exclusively by Automatic Electric Sales Corporation, 1033 West Van Buren Street, Chicago 7, Illinois.

TAYLOR-COLQUITT CO.
SPARTANBURG, SOUTH CAROLINA

PLANTS AT SPARTANBURG, SOUTH CAROLINA AND WILMINGTON, NORTH CAROLINA



Do you know these facts about FLEXIDUCT?



It's the new rubber floor duct that solves over-floor wiring problems quickly and effectively, with adequate protection from sweepers, mops and equipment on casters. Installation is easy and permanent. You just fasten Flexiduct in place with its own special cement. There's no drilling or necessity to use screws and fasteners. Flexiducts' flexibility allows it to adhere evenly and securely to all types of floor surfaces and it is adaptable for installations ranging from 2 conductors to 25 pair switchboard cables. Write for complete information regarding Flexiduct and your wiring problem today.

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60 years
Porcelain Products, Inc.
FINDLAY, OHIO
PP INC.

Readings: R1 = 150; R2 =805

$$Dx = \frac{150 \times 500}{150 + 805} = 78.9 \text{ feet out to open}$$

$$Dy = \frac{805 \times 500}{150 + 805} = 421.1 \text{ feet back to open}$$

Dg = 78.9 + 421.1 = 500

Time: 2½ hours — two openings — one man

Remarks: 3 inches off

The time required in each case includes the time taken to open the cable sheath, repair the break, and close up the sheath, using the standard slit sheath method.

FIGURE 6:—Van Web hydraulic pole jack. (Photo courtesy of Suttle Equipment Company.)

Hydraulic Pole Jack

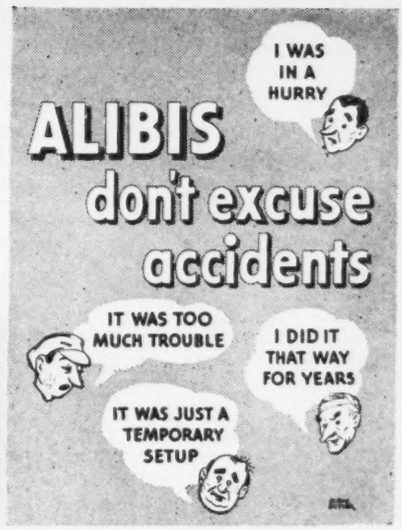
THE VAN WEB hydraulic pole jack is a new type of jack designed for pulling up or straightening poles. Although it weighs only 53 pounds, it is stated to be able to pull 7,500 pounds a distance of 60 inches, or 15,000 pounds, 30 inches.

The hydraulic jack illustrated in *Figure* 6, has a lifting distance of 60 inches at the hook through the pulley that doubles the lift of the ram. A chain hook, replacing the pulley, provides double the power for a 30-inch lift. The jack is stated to be very sturdily built for this lifting effort without stresses or strains. Under tests, it pulled up a 40-foot pole with 16-inch butt that had been set 8 feet in the ground, with only 8,000 pounds force.

The jack with the ram depressed is 41 inches long. The pump handle measures 25 inches and folds down at the side. No special strength is required to operate the handle. The hook lifts ¾ inch on each stroke. A shut-off valve is located at the top of the cylinder and the ram can be easily pushed back into the cylinder when this valve is opened.

The jack is easily set up by a pole, requiring only a base laid on the ground to stabilize the jack during its operation. For straightening poles, the pulley yoke can be pulled out for setting a pike pole in the cup at the top of the ram.

Reducing Accident Costs



Through Proper Records

NO BUSINESS can afford to be uninformed of its accident losses. As they have come to realize this, many small businesses have followed the example of large industrial plants and have begun to analyze accident costs carefully. In order to do this, they maintain records of accidents just as they do of production costs, production rates, and income.

Accident records bring to light many facts that the managers of small plants had not realized before. For example, the manager of one plant could not recall a single disabling injury in his plant over a period of a year. Yet a check with the company which insures his plant showed that three disabling injuries had occurred in the plant during that period. Since the manager had no record of these injuries, there was no way in which he could tell how much they had cost.

Determining A Plant's Injury Rate

BY KEEPING records of your plant's accidents, you will be able to learn how much the accidents are costing you, and you will also be able to compare your plant's injury frequency rate with that of other plants in the industry. Comparison of the plant's rate each quarter with the rates for previous quarters also will serve as a gauge of the progress of your safety program.

The standard for measuring a plant's injury rate is called the injury frequency rate. This is the number of disabling injuries per million man-hours worked. Briefly, the injury frequency rate is figured by multiplying the number of disabling injuries by 1,000,000 and dividing the product by the total man-hours worked. Expressed as a simple formula,

$$\text{Frequency rate} = \frac{\text{Number of disabling injuries} \times 1{,}000{,}000}{\text{Number of man-hours worked}}$$

A full explanation of the standard is given in "Measure Safety — Injury Frequency Rates" — Bulletin No. 102, available from the Bureau of Labor Standards, U. S. Department of Labor, Washington 25, D. C.

Suppose that three disabling injuries occurred in a particular plant during a three-month period. Is that a good record or a bad one? The answer depends on how many hours the employes worked during the period. Say that the employes worked 240,000 hours. Using the formula for the injury frequency rate, you would find that the plant's injury frequency rate, for the quarter, was 12.5. Comparison of this rate with the quarterly frequency rates issued by the Bureau of Labor Statistics would show that it is below the average, for manufacturing industries as a whole, of 13.5 in the first quarter of 1952. For specific industries, however, the rates ranged down to 1.7.

What Are Disabling Injuries?

INJURY FREQUENCY rates are based on disabling injuries, those that (1) cause permanent bodily impairment or (2) prevent the worker from returning to his job at the beginning of the next day or shift.

Under (1) are included injuries resulting in death or in any permanent impairment. A permanent impairment may mean loss of a member of the body or any part of it. Under (2) are included all injuries that result in temporary disability.

First-aid cases are not counted in figuring the frequency rate. Nevertheless, it is worth while to record and study them, since they often reveal accident hazards which might lead to serious injuries.

One safety engineer found that of 330 accidents studied, 1 resulted in a disabling injury; 29 resulted in first-aid cases that did not prevent the worker from continuing on the job; and 300 involved no injury to a worker. This study indicates that

for every accident which causes an injury, there are a great many accidents which involve no injury at all. This is significant because any accident contributes to some production loss through broken machines or material, replacement or repair time, lost time of workers and supervisors, time needed for investigation of the accident, and many other factors.

What Information Do You Need?

TO ELIMINATE accidents, it is first necessary to know how, where, and why they occur. For this, an accident investigation and report form is desirable. The style of such forms varies, but the questions usually follow this pattern:

Department
Name and age of injured person
Occupation of injured person
Type of work
Date of accident
What condition caused the accident?
What was done unsafely to cause the accident?
Description of accident
Nature of resulting injury
Preventive measures recommended

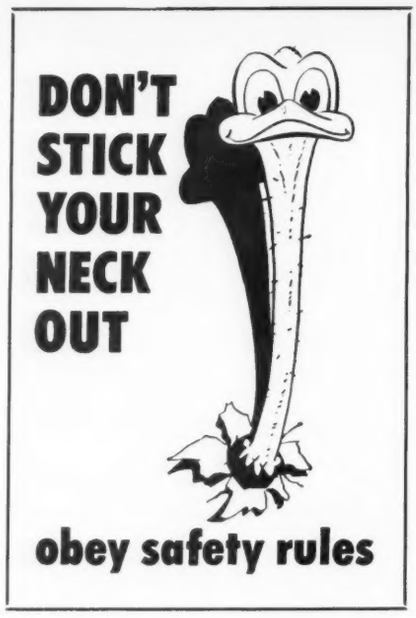
A report of this type will provide the information needed to correct other conditions, similar to those that caused the accident, wherever they exist in the plant. It will also include information necessary to prepare workmen's compensation insurance papers.

By checking accident reports, you may find repeated accidents on a certain type of work. This would indicate some condition which needs correction. For example, if you find repeated cases or worker strain from lifting, you may need to change the system for handling heavy articles, improve the equipment, or train the workmen in proper lifting methods.

Learning The Cost Of Accidents

TO OBTAIN accurate accident cost data, a careful study of all plant accidents is necessary. However, it is relatively easy to make a rough estimate of costs. *For every dollar of compensation and medical cost resulting from a disabling injury there is, on the average, four dollars of indirect costs.* This ratio may seem high, but actual plant studies have proved it to be a conservative average figure.

Suppose that you check your accident reports and find that during the past three months there were three accidents which caused disabling injuries, and that for these injuries a total of $200 was paid in workmen's compensation and $150 was paid in medical fees. The direct cost of the three injuries, then, was $350. The indirect cost (four times the direct cost) would be $1,400 for the three injuries. Thus, the total actual cost for these three injuries would be $1,750, although direct costs in most plants would be covered by the payment of workmen's compensation insurance premiums. However, the $1,400 of indirect cost alone would have paid much of the cost of plant improvements designed to remove the causes of such accidents.



If it seems doubtful that injuries as costly as this, a careful survey and study of the plant injuries (including every factor that involves loss) will give a more accurate basis for figuring the losses. In making such a study, here are some indirect costs.

Property damage and repair.
Material destroyed or damaged.
Machinery repair or replacement.
Shutdown, depreciation, and tie-up.
Extra labor cost for cleaning up after the accident.
Transferring another worker to take the place of the injured employe, or hiring and training a replacement.
Unproductive wages paid to:
Employes who stop work to see what has happened.
Safety committee while it investigates the accident.
Employes who give first aid to the injured.
Employes and/or foreman who instruct replacement.
Foreman while he investigates, makes his report and secures a replacement.
Top supervision while receiving and filing report with insurance company.

Who Should Keep The Accident Records

TO INSURE proper maintenance of accident records, one person should be made responsible for seeing that injury reports are submitted promptly and that accident records are properly maintained at a central point. To a large extent, the size and organization of the plant will determine who should be given this assignment. In almost every instance, the immediate supervisor or foreman should be made responsible for submitting the initial accident report. In the very small plant, it is possible that a supervisor or foreman also will be given the responsibility for maintaining the central file of accident reports and data.

Put Records To Use

ACCIDENTS, INJURY, and cost records have great value as reference data and for comparison with insurance company or other outside reports, as pointed out. However, they may also be used to advantage in other ways. Some of them are:

1. Used as topics for discussion in meetings with the foremen or plant personnel, the reports serve to give the employe a picture of plant conditions. When foremen and workers know what accidents cost, they are more likely to take responsibility.

2. Reports or graphs of accident experience can be used on bulletin boards or in plant papers or magazines to advertise the interest of management in the plant program.

3. Accident records can be used as a basis for competition between departments, recognition being given to the best department.

4. Accident records and cost figures can be used in preparing annual budgets pointing to the need for preventive expenditures, and as justification for money already expended.

—Adapted from a report issued by the Small Defense Plants Administration.

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BETTER BUSINESS METHODS

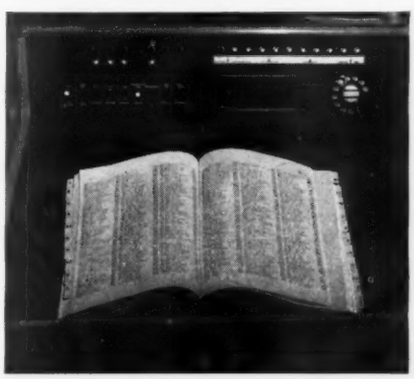
For Greater Profits Through Lower Costs

Flexoprint and Xerography Team Produces Information Telephone Directories Faster, at Lower Cost

The Peninsular Telephone Company, one of the nation's largest independents, has slashed the cost of producing accurate, up-to-date information directories, *and decreased inquiry-handling time by approximately 10%.*

Method Cuts Correction Costs

Using the Flexoprint-Xerox Method, Peninsular Telephone gains the flexibility of type setting with the economy of typewriter composition. Each correct listing is typed and proofread only once, as Flexoprint provides for unlimited directory expansion without retyping any correct standing listing. With typing and proofreading held to a minimum, Peninsular achieves the greatest possible accuracy at low cost—a *must*, considering the continuous change necessary in information directories.



Method Cuts Duplicating Costs

Once set up on Flexoprint panels, directory pages are reproduced by Xerography, in equipment manufactured by The Haloid Company. It takes only 3 minutes to reproduce a page, which saves operating time and cuts labor costs. The process requires no negatives, and creates plates that can be used many times.

Free Descriptive Folders

The Flexoprint-Xerox Method is described in step-by-step detail in folder KD749, and is discussed in actual operation at the Peninsular Telephone Company's Tampa, Florida exchange in folder KD764. Read them and see for yourself the speed, accuracy and economy the Flexoprint-Xerox Method brings to information switchboard operation.

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This new Customer Service Counter is compact, yet so versatile it houses all record form sizes. The clerk works comfortably seated, facing the customer. Complete cashiering and bookkeeping facilities are within arm's reach, so there's no lost time or motion, no extra desk taking up valuable floor space. This unit offers outstanding economy in Commercial Office operation, where counter service is not a full time job, and still it

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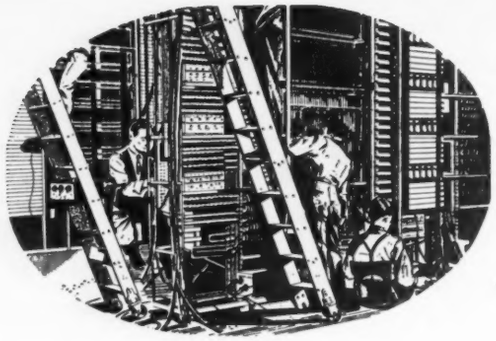


Questions and ANSWERS

Conducted by JAY G. MITCHELL

IN THIS ISSUE Mr. Mitchell discusses — (A) A scrambled dial telephone circuit; (B) The common electrical units; and (C) Lead-acid storage battery charging data.

QUESTION: — *We have a number of dial telephones, hand set type, on base with the circuit as per attached sheet. These require a 3 conductor cord from the coil-bell box to hand set base but require a 4 conductor cord from the base to the hand set. Is there any way to change this circuit so as to use a 3 conductor cord to the hand set also? Stamped envelope enclosed.*

ANSWER: — This inquiry together with the sketch sent in with it has been given the most careful study. The latest types of dial telephone, which are arranged for anti side tone transmission, are equipped with hand sets having four terminals, two for the receiver and two for the transmitter. Obviously sets of this kind will require a 4 conductor cord from the base to the hand set. In the sketch which was received with this inquiry, however, the telephone ringer, induction coil and ringing circuit condenser are mounted in the bell box leaving only the dial with its connections in the hand set base.

QUESTIONS AND ANSWERS is under the necessity of requesting additional information before an answer to the direct inquiry can be given. It is suggested that this company send in a complete circuit and, if possible, the code number and manufacturer's name of the telephone in which it is desired to substitute a 3-conductor cord for the 4-conductor cord supplied to connect the hand telephone and mounting base. A change such as the one suggested must be most carefully considered as otherwise serious impairment of transmission may be the result of changing the character of the circuit. Please write in again and supply all pertinent information as suggested.

QUESTION: — *Would it be possible to briefly describe the common electrical units? We find that it is sometimes very difficult to understand the operation of some of the telephone equipment in our charge by reading the technical description. Of course it is clear that the commonly used units have an exact relationship. This is the kind of explanation we would appreciate receiving rather than the historical background of each one.*

ANSWER: — This inquiry hits upon one of the gaps found in many explanations and instruction books for telephone and other communication equipment. Brevity is very desirable and, for that reason, the answer prepared a long time ago to cover this precise inquiry is quoted here once more. It is suggested that this answer be clipped and placed in a pocket wallet from which it is accessible for study as occasion arises.

"The unit of electromotive force is the volt. Electromotive force may be roughly defined as electrical pressure. In an electrical circuit the voltage is the pressure at which the energy is being released in the form of electrical current. The ampere is the unit of current flow and may be roughly defined as the total amount of electricity passing each second in an electrical circuit having a resistance of one ohm through which current is being forced at a pressure of one volt.

"The ohm is the unit of electrical resistance. It is the resistance offered to the passage of an electrical current by a column of mercury 106.3 cm. long having a uniform cross sectional area of 1 sq. cm. This is approximately the same as the resistance offered to the passage of electrical current by a No. 10 B.&S. gauge copper wire 1,000 feet long. The coulomb is a unit of electrical quantity. It is interesting because the passage of 1 coulomb per second in any given electrical circuit constitutes a current strength of 1 ampere."

To this practical outline of the principal electrical units it may be of help, in view of recent electronic developments, to add the statement that 1 coulomb is equal to about 6,240,000,000,000,000,000 electrons.

Because QUESTIONS AND ANSWERS believes that this is a most helpful type of inquiry, under present conditions, it is hoped that some further theoretical questions may be raised. A practical understanding of these complex quantities is not difficult to acquire and it can be acquired without too much trouble and will be most useful to any one engaged in modern electrical communication.

QUESTION: — *Some time ago a method of computing the internal resistance of a Lead-acid storage battery was printed in* TELEPHONE ENGINEER. *We are having some trouble in the operation of our central office battery and wish to check our present practices to make sure that we are not at fault in some way in the operation of this part of the equipment. A brief review of the matter will be very much appreciated.*

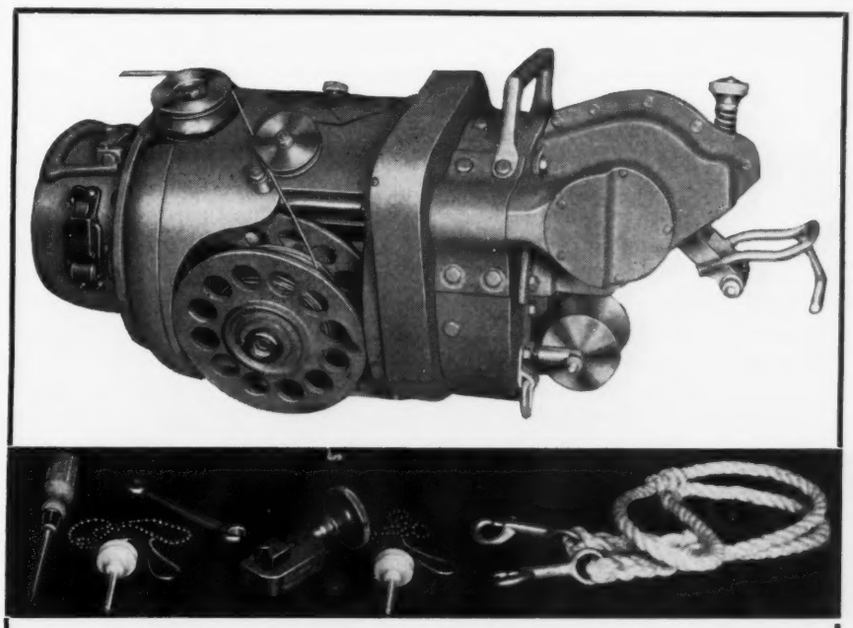
ANSWER: — Since no information is given in this question as to the

size of the battery (size and number of plates in each cell or the number of cells involved) the reply must be of a very general character. The following data will be of value to this telephone company in this matter. It should be said however that slight variations in the factors outlined briefly are not important and may be disregarded in individual cases because of the variation in the products of different manufacturers and in the mode of assembly and installation.

In general it will be proper to set the strength of the charging rate, in amperes, at a figure obtained by computing the *superficial area* of the *positive plates.* If, for illustration, the positive plates are 10 inches by 10 inches and there are six positive plates in each cell the superficial area of the positive plates will be 1,200 square inches. (10 times 10 times 2 times 6 equals 1,200). Now allow one ampere of charging current for each 20 square inches of superficial area of positive plates. In the illustrative example this will be 1,200 divided by 20 or 60 and for such a cell the charging rate for a 10 hour complete charge is 60 amperes. For such a battery the *voltage* that must be provided is composed of two components one to create the current required to effect the chemical changes of the charging process and one to balance the effect of the internal resistance of the battery in opposing the passage of the charging current as a part of the *charging circuit.*

The component of the charging voltage first mentioned is about 2.6 volts *per cell* in the battery and for a battery of 20 cells in series, for illustration, will be 20 times 2.6 volts or 52 volts. The second component mentioned will be equal to 4 divided by 10 times the normal 10 hour charging rate multiplied by the number of cells *in series* in the battery. In the assumed illustration this would be $\frac{4}{600}$ multiplied by 20 (since there are 20 cells in series) and would obviously show a value for this component of the charging voltage of 4 times 20 divided by 600 or 0.133 volts. Adding this component of the voltage to the value of the voltage required for the chemical process of charging results in a total of 52 plus 0.133 volts. In the assumed illustration it would be best to provide a charging source of such a character as to provide a charging current of 60 amperes and a maximum voltage at that output, to insure reasonable margin for regulation, of about 55 for the charging of the battery, in about 10 hours.

When the storage battery is floated in parallel with the generator it is necessary, in making this kind of computation to compile a record of the output of the battery, the simultaneous output of the generator and the time in which the load on the battery is sufficiently reduced to consider it a charging period. Obviously the generator must provide an output in ampere hours slightly greater than the output of the battery in ampere hours to prevent the gradual accumulating deficiency in the state of charge of the battery which can be the cause of damage if not rectified. —THE END.



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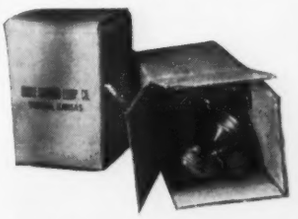

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Association NEWS

"The individual, no matter how strong as an individual, is weak without the strength of his group. And the beauty of American organization is that individuality is stimulated, not suppressed."—Merle Thorpe.

A monthly department featuring condensed reports on activities of Independent Telephone Associations. Abstracts of convention papers will appear in future issues.

Missouri Tel. Association Holds District Meetings

DURING THE week of September 13, the Missouri Telephone Association held District Meetings at Cameron, Macon and Springfield.

Ray Coffman, first vice president of the association presided at and addressed the three meetings. Carl L. Spaid, the president of the association was unable to attend due to the fact that he was recuperating from illness.

Harold Stouffer, chairman of the association's General Small Company Committee, reviewed the purpose and results of the District Committees working with the small companies to help them give better telephone service. Special emphasis was placed on the essential steps of a successful improvement program, such as adequate accounting records, market survey, appraisal, rate increase and financing. Mr. Stouffer stated that the salvation of the small companies and mutuals is acquisition or consolidation in order to form larger and stronger commercial companies and urged Independent companies to serve areas adjacent to their own exchanges.

Mr. Stouffer also reported on the plan for selected personnel of the District Committees to work with the Engineering Staff of the Missouri Public Service Commission in making actual appraisals of small telephone companies. Four pilot cases are being completed, including field work, pricing and presentation to the commission. He said that this activity will be continued because many companies need to know their plant investments.

Mr. Stouffer stated that the Association had recently mailed a questionnaire to member companies asking their reaction to the Association Improvement Program. The General Small Company Committee reviewed the many replies and summarized the analysis as follows:

(1) They were unanimous in endorsing the program as one of the finest projects undertaken by the Association.

(2) It was helping the individual companies improve their operations.

(3) The District Committees were actively assisting the small companies on their problems.

(4) The Educational programs at the meetings should be continued.

(5) The small companies are becoming better acquainted with the Commission Staffs.

(6) The program should be continued so that the Missouri Independent Industry will be able to furnish improved telephone service.

At the morning sessions, George Hearne, past president of the association, spoke on "A Good Commercial Job will make you Money and Improve your Customer Relations." He said that "doing a good Commercial job consists of first, making money or seeing that the revenues of a company are adequate to keep the business sound financially and second, developing customer relations and public good will."

Mr. Hearne said "that if you will tell your employes and the public about your telephone program while it is being developed, it will pay you dividends. You can make money for your company and keep your customers happy if you will work hard on all phases of the commercial job."

R. W. Hedrick, secretary of the Missouri association also spoke on the morning programs about services of the association and invited telephone companies to use the associa-

The above group attended the Macon District Meeting of the Missouri Telephone Association.

The above group attended the Springfield District Meeting of the Missouri Telephone Association.

tion's offices for service on all problems.

He also called attention to the fine success the Association Small Company Committees had in working with small Independent telephone companies in helping them improve their operations and giving better telephone service. He said that "these committees had been largely instrumental in creating better understanding and cooperation of the Missouri Public Service Commission in telephone company problems."

The Cameron meeting sponsored by the Middle States Utilities Co. of Missouri was attended by representatives of 16 companies and 40 exchanges. The Missouri Telephone Co. showed that at the Macon meeting 18 companies and 40 exchanges were represented. The Western Light & Telephone Co., Inc., sponsored the Springfield meeting and representatives of 50 companies and 70 exchanges were in attendance.

Kelly McNish Heads Tennessee Association

THE ANNUAL Convention of the Tennessee Telephone Association was held at the Hermitage Hotel, Nashville, Tenn., on September 16-17. The meeting was attended by 180 persons representing over 90% of the telephone companies operating within the state.

An address was delivered by Colonel William C. Henry, president, Northern Ohio Telephone Co., Bellevue, Ohio, who spoke on behalf of the United States Independent Telephone Association.

Other talks were given by: Jim Lanham, representative, Shumway J. Bird & Co., who spoke on "Accounting Principles and Practices"; Cecil H. Thomas, general commercial manager, Inter-Mountain Telephone Co., Bristol, Tenn., who spoke on "Commercial Practices"; William S. Slusher, telephone engineer, who spoke on "Plant Planning"; J. A. Davis, division information manager, Southern Bell Telephone & Telegraph Co., and the Honorable J. J. McCord, commissioner, Tennessee Department of Conservation.

Officers elected were: President, Kelly McNish, Bristol, Tenn.; First-Vice-President, Ralph E. Thorne; Second Vice-President, R. Lee Wheat; Third Vice-President, H. R. McDonald; and, Secretary-Treasurer, T. S. Lauver.

Rocky Mountain Group Meets at Salt Lake

FOR THE SIXTH consecutive year the Newhouse Hotel, Salt Lake City, Utah was the meeting place for the annual convention of the Rocky Mountain Telephone Association. Salt Lake City is a central location for their meetings and the Newhouse Hotel an excellent spot for the members to enjoy themselves.

On the morning of September 16, 1954 over 150 persons, members of the Association from the States of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming, as well as visitors from the East, and several of the Independent telephone people from the State of Washington, and many of the Associate members, assembled.

R. A. Manuel, president of the Association, and owner of the Browning Telephone Co., Browning, Montana, called the meeting to order, the first order of business being the presentation of the keys to Salt Lake

Officers of the Tennessee Telephone Association (l. to r.): KELLY McNISH, president; RALPH E. THORNE, first vice-president; R. LEE WHEAT, second vice-president; H. R. McDONALD, third vice-president; and, T. S. LAUVER, secretary-treasurer.

Directors of the Tennessee Telephone Association seated (l. to r.): DAVE ODLE, J. R. RICHMOND, RALPH E. THORNE, W. K. SHELL, and W. S. HOWARD. Standing (l. to r.): H. R. McDONALD, JR., JOHN J. MORAN, R. LEE WHEAT, KELLEY McNISH, H. W. VAUGHAN and W. C. THOMAS.

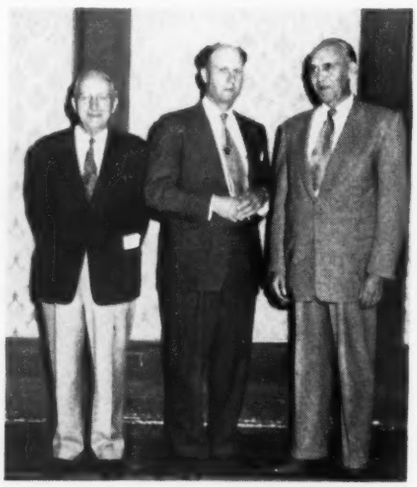
City to Mr. Manuel by Mr. Christoffer, city attorney.

Reports of the accomplishments and status of the association were presented by President Manuel and Secretary-Treasurer J. W. Baker. These reports indicated that the Regional Small Companies Committee has served the members well and that the Association had received a number of new members.

The first address of the session was given by E. C. Aaberg, Utah general manager for The Monutain States Telephone & Telegraph Co., Salt Lake City, Utah. His topic was, "Meeting Current Problems," and he discussed the stimulation of long distance business, reciting a number of examples of the approach which could be made to various customers regarding the further usage of long distance to their benefit.

He also talked about the development of outdoor pay station booths and the favorable experience they are having with these installations when they are properly located. He said that this is something which almost every Independent company operator can take advantage of quickly.

Mr. Aaberg also discussed the advantages of selling directory advertising in the directories issued by the Independent operators. The benefit of this type of selling, he stated, is



Officers of the Rocky Mountain Telephone Association for the 1954-1955 term. Standing (l. to r.): — J. W. "DICK" BAKER, secretary-treasurer, Coeur d'Alene, Idaho; WARD BLAZZARD, vice president, Kamas, Utah; and, C. M. HART, president Kingman, Ariz.

extremely good and many of the men have found that they have supplemented their income very agreeably by spending the time necessary to develop advertising in their directories. Mr. Aaberg said he is convinced that their customers are getting more than a dollar's worth for every dollar spent.

Warren B. Clay, 1953-54 president of the United States Independent Telephone Association, and president of the Hutchinson (Minn.) Telephone

Please Turn To Page 82

Construction and

WITH THE DOUBLE

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LEADING

Stranterm
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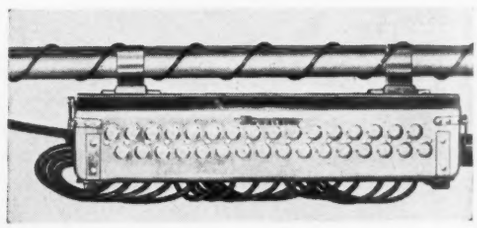
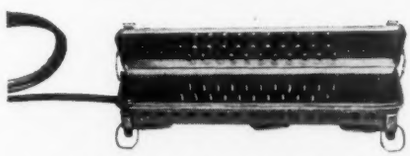
cable terminal



Compact, lightweight and easy to install

For lead or plastic cable installations. All terminals are supplied with 3½-foot, 24-gauge cable stubs, which are soldered to heavy Everdur studs imbedded in a special unsaturated Polyester thermal setting plastic with fibre-glass filler, which provides indestructible, moisture-proof, gas-tight potting of the terminal core.

Additional flexibility is provided in that the 11-and 16-pair cable stub and core are interchangeable in the standard terminal housing. Left and right hand cable entrance to the terminal box is also possible.



The Stranterm is the only Strand Mounted Terminal which permits the installer to apply protection to the pairs requiring dischargers, or to install the same terminal unprotected.

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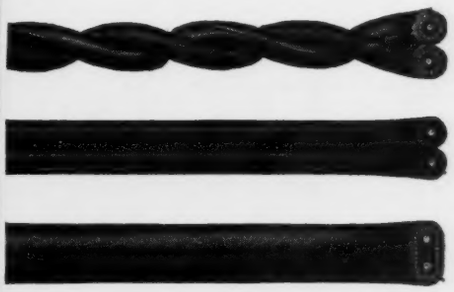


✔ **Copperweld conductors** for strength

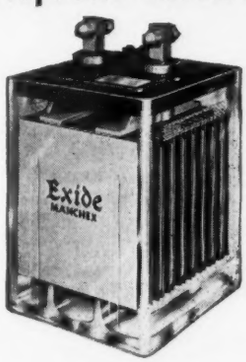
✔ **Habirshaw insulation** for reliability

✔ **Neoprene sheath** for high resistance to abrasion and weathering

PHELPS DODGE COPPER PRODUCTS

CORPORATION

Exide-Manchex
telephone batteries



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This is proven daily in exchanges of every size . . . for over 60 years Exide Batteries have been serving the Telephone Industry . . . the Manchester positive plate with its exclusive button type construction provides exceptionally long life . . . latest developments on molded glass jars permit compact space saving installation . . . heavy terminal posts with copper inserts provide extra conductivity for sustained voltage at high discharge rates . . . microporous rubber along with slotted plastic separators, are impervious to chemical and electrical reactions . . . plastic spacers assure plate alignment . . . for assured dependability, long life and low-cost maintenance use Exide Manchex.

The Electric Storage Battery Co.
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1888 . . . Dependable Batteries for 66 Years . . . 1954

. . . bigger savings plus better service with

Raytheon RectiFilteRs*!

For more than two decades, leading independent telephone companies have found that Raytheon RectiFilteRs are the most economical and efficient way to supply steady DC power to PBX boards directly from an AC source.

With no moving parts, the Raytheon RectiFilteR requires neither adjustment nor maintenance. It will outlast many sets of batteries, release wires carrying charging current from central office to subscribers' PBX boards for revenue producing service, and minimize power cost because of high efficiency in converting from AC to DC.

Dry disc rectifying units and other components are designed for long-life, trouble-free service. The Raytheon RectiFilteR will end your telephone power problems. Just plug it in, close the door—and forget it!

*Reg. U. S. Pat. Off.

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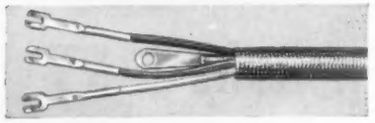

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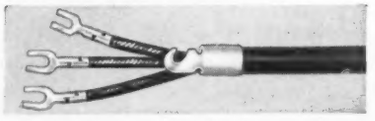

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COTTON cords are in standard use everywhere. Their fine woven wrap makes them very serviceable for all around purposes.

Take your choice—Neoprene, Nylon or Cotton. They're all high quality cords made in accordance with Runzel high standard of quality. We carry a large stock of cords for every purpose.

Our geographical location means QUICK SERVICE.

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Cord and Wire Co.
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Co., spoke to the group on the subject, "Greetings from the U.S.I.T.A."

The second convention session started with the Demonstration: "A 'Live' Exhibition of Devices for the Protection of Outside Plant Against Lightning and Foreign Power Contacts," presented by R. J. Motzkus, Utah outside plant supervisor, The Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.

E. C. Weitzell, chief, Telephone Operatons & Loans Division, Rural Electrification Administration, Washington, D. C. concluded the session with his discussion of the rural telephone program.

The final convention session opened with the address, "Program of Small Company Service Improvements," delivered by Ray Red, assistant vice president of the General Telephone Co. of the Southwest, San Angelo, Texas. This address was to have been presented by Walter G. Wright, president of General of the Southwest, but business affairs prevented him from attending the convention.

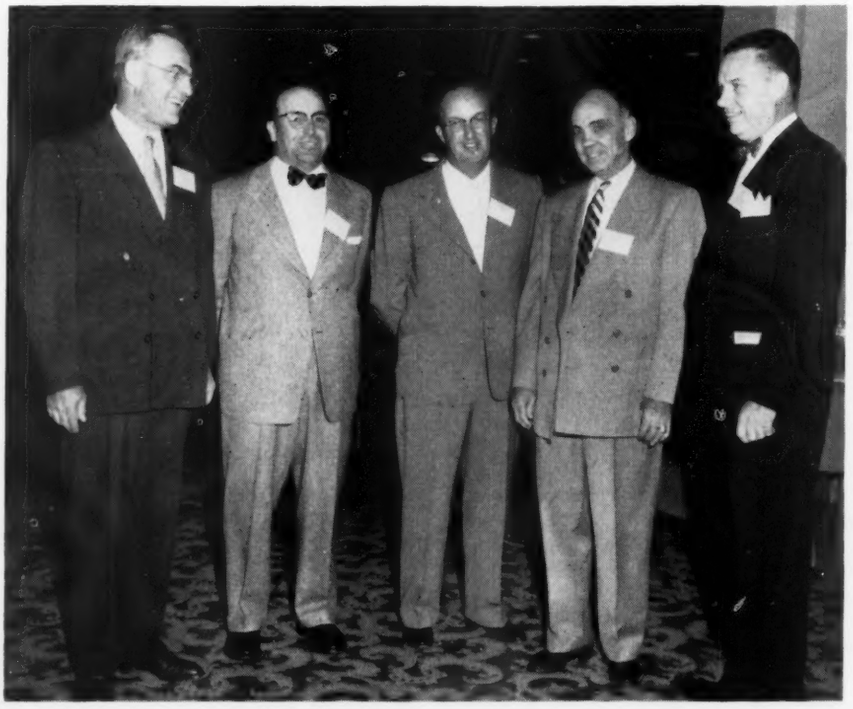
Rulon Callister, district manager of the Millard County Telephone & Telegraph Co., Delta, Utah, concluded the program with his address, "What We Are Doing to Improve Earnings."

Visiting during the Rocky Mountain Telephone Asssociation convention (Standing l. to r.): — MERLE EBBE, Mountain States Power Co., Kalispell, Mont.; DICK BAKER, Coeur d'Alene, Idaho; and, C. L. PARKER, Sault Lake City, Utah.

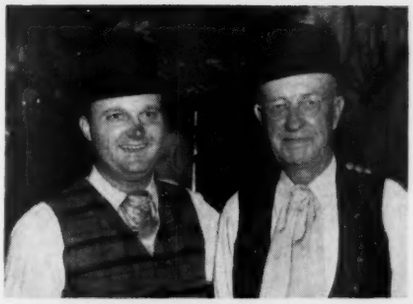
During the business meeting the following officers and directors were elected to serve the Association for the ensuing year:

President, C. M. Hart, Citizens Utilities Co., Kingman, Ariz.; Vice-President, Ward Blazzard, Kamas-Woodland Telephone Co., Kamas, Utah; Secretary-Treasurer, J. W. Baker, Coeur d'Alene, Idaho;

Directors: Robert Brown, Parma Telephone Co., Parma, Idaho; Rulon Callister, Millard Co. Tel. & Tel. Co.,



ROCKY MOUNTAIN CONVENTIONEERS: — (Standing left to right) — E. C. AABERG, Utah general manager, The Mountain States Tel. & Tel. Co., Salt Lake City, Utah; WARREN B. CLAY, president, U.S.I.T.A., Hutchinson, Minn.; RANDY MANUEL, president, R.M.T.A., Browning, Mont.; D. A. McLEAN, Independent company relations manager, The Mountain States Tel. & Tel. Co., Denver, Colo.; and, C. L. PARKER, Utah commercial engineer, The Mountain States Tel. & Tel. Co., Salt Lake City, Utah.



Acting as waiters at Leich's "Gay 90's Party" during the recent United States Independent Telephone Association Convention were (Top photo, l. to r.): — RICHARD D. FRIEHE, West Central district manager and H. A. WHITE, Lincoln, Neb. Bottom photo (l. to r.): — PHIL RICHARDS, Leich's Minnesota representative; L. J. RIZZO, vice president; and HUGH SKIDMORE, Eastern District manager.

Delta, Utah; T. Clark Callister, Millard Co. Tel. & Tel. Co., Fillmore, Utah; J. W. Corbin, Midland Telephone Co., Moab, Utah; Earle Crandall, Pinedale Tel. & Tel. Co., Pinedale, Wyo.; C. W. Haas, Big Timber Home Telephone Co., Big Timber, Mont.; R. A. Manuel, Browning Telephone Co., Browning, Mont.; D. A. McLean, The Mountain States Tel. & Tel. Co., Denver, Colo.; J. F. Monsen, Aberdeen Telephone Co., Aberdeen, Idaho; Roy Priest, General Telephone Co. of the Southwest, Carlsbad, N. M.; Floyd L. Reyher, Haxtun Telephone Co., Haxtun, Colo.; J. F. Thiele, Pagosa Springs Tel. Co., Pagosa Springs, Colo.; J. E. Tipton, Espanola Telephone Co., Espanola, N. M.; and M. O. Trego, Mona Short Line Telephone Co., Sundance, Wyo.

The Executive Committee consists of C. M. Hart, Ward Blazzard, R. A. Manuel, D. A. McLean and J. W. Baker.

Helpful Literature And Booklets

"When Memory Needs a Jog."—The National Foremen's Institute, New London, Conn., is sending a free sample copy of its *Supervisor's Memory Jogger* to executives interested in circulating the handy little booklet to supervisors and middle management personnel in plants or offices.

For a free sample copy, write *Dept. TC, National Foremen's Institute, New London, Conn.*

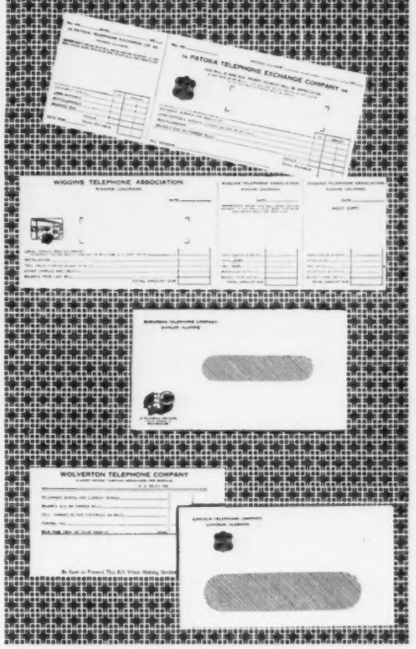
Personnel:—The latest edition of a catalog of personnel materials for business and industrial use is available now. The catalog has been released by Science Research Associates, leading publishers of tests and employe relations material.

Personnel men will find the items in this catalog helpful in selecting better employes, increasing employe performance, choosing employes for promotion, and reducing employe turnover. Included are general personnel tests, as well as specialized tests for clerical and office, and shop and factory employes.

Of special interest is the SRA Employe Inventory, a morale survey measuring the feelings of employes about their jobs, their pay, and the company they work for. All materials and services in the catalog are useful to any type of company, regardless of size.

Copies are available to personnel, industrial relations, and management executives. Write Dept. TEM, Science Research Associates, 57 West Grand Ave., Chicago 10, Ill.

Billing Supplies Made To Your Order In Suttle's Print Shop



A telephone man knows the way billing forms should be made up to fit in with his particular method of billing. But, sometimes it is hard to get the forms printed just right.

It will pay to chcek into Suttle's special service. We produce billing forms Made-to-Order (just as you want them). Our printing department prints bills for more telephone companies than any other printer in the country. It stands to reason we should be able to give you a more satisfactory job—we undrestand your needs.

You don't need to make up elaborate copy to get your bills printed. Just let us know your wishes. A sample of your old form with changes marked, or a rough pencil sketch to give us just a hint as to the ideas you have.

We will gladly quote prices for printing billing supplies. Just let us know what you want and how many. If you're in a big hurry just send your copy with an order. You will get prompt service and still be billed at the lowest price you would be quoted.

WRITE TO SUTTLE ABOUT YOUR REQUIREMENTS FOR BILLING SUPPLIES

See Your SUTTLE Catalog

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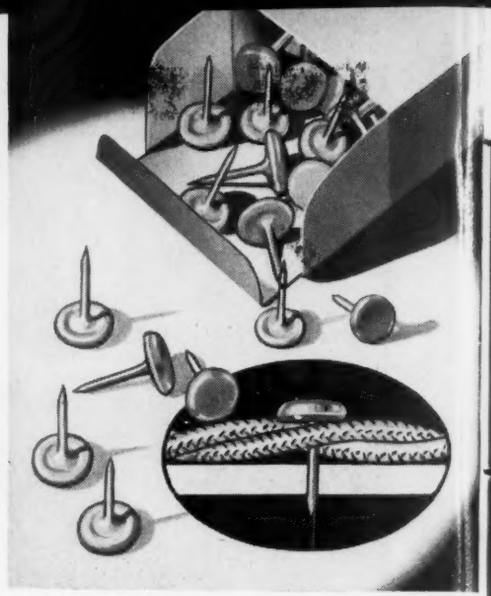
The Expanding Plates and Spreader Arms of Everstick Anchors insure 100% safety and maximum holding power under excessive strain. Ribbed base plate allows anchor to be locked solidly on rod. Quickly installed. Made by EVERSTICK ANCHOR CO.

New and Different! — TRIG-R-HEAT Soldering Gun heats instantly on AC or DC—requires no transformer. Gun has built-in light and a 6″ reach—weighs only 12 oz. Equipped with ¼″ Iron Clad Tip, has wattage range of 400-150. P. WALL MFG. CO.



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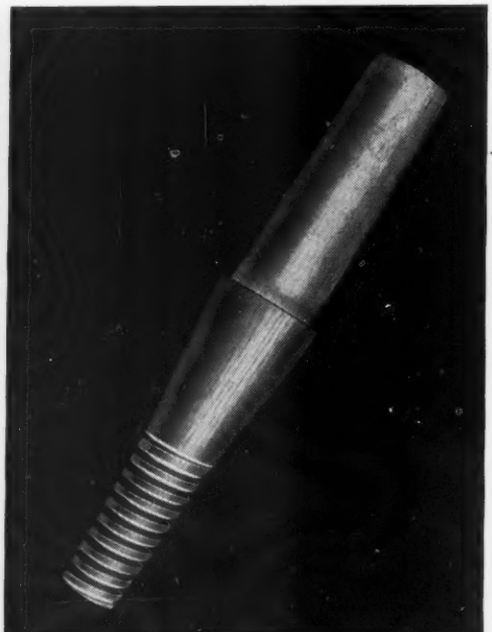

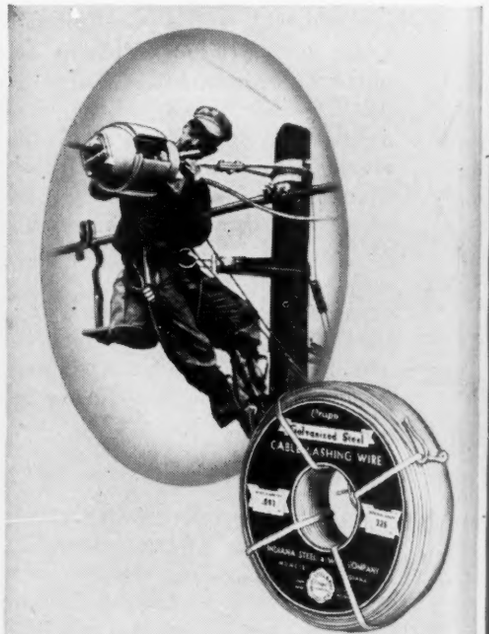

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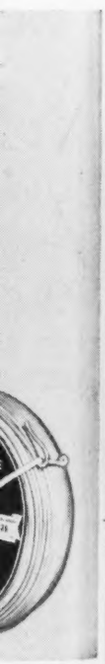

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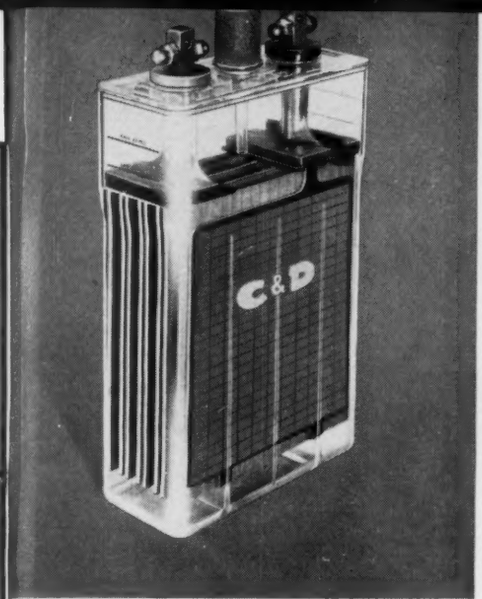
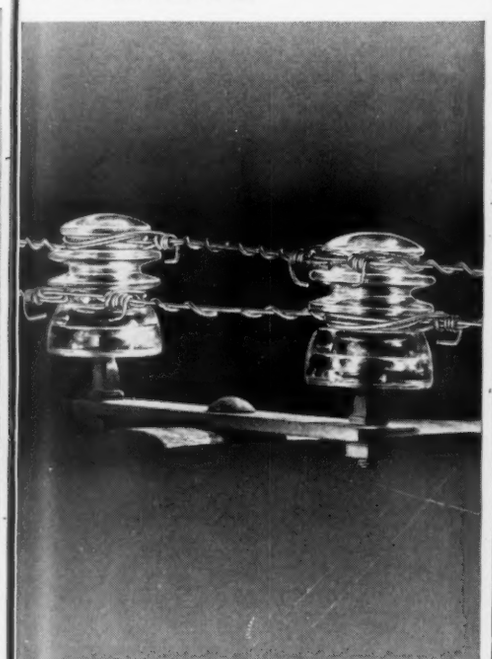


Available with lead-calcium grids (PlastiCal) for projected life of 25 years in full-float service—or with high-tensile special alloy grids (PlastiCell) for conventional life expectancy of 14 years. Made by C&D BATTERIES, INC.

For Point Transposition on Rural Telephone Circuits —Hemingray Insulators No. 56 require no special hardware — transpositions can be made on standard pins. Packed 40 to a carton, each in separate compartment. Product of OWENS-ILLINOIS.



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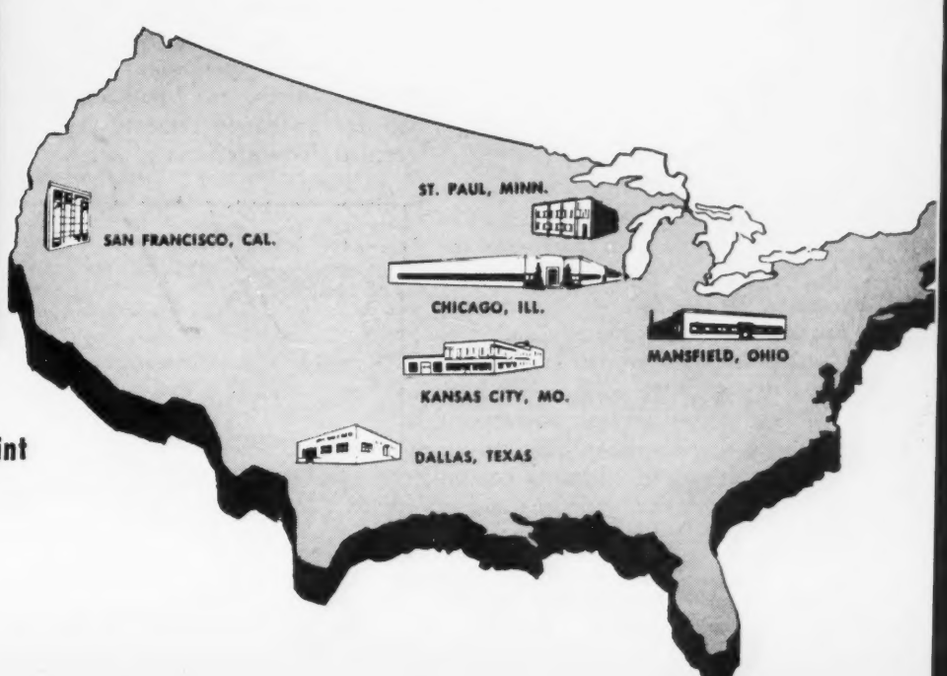

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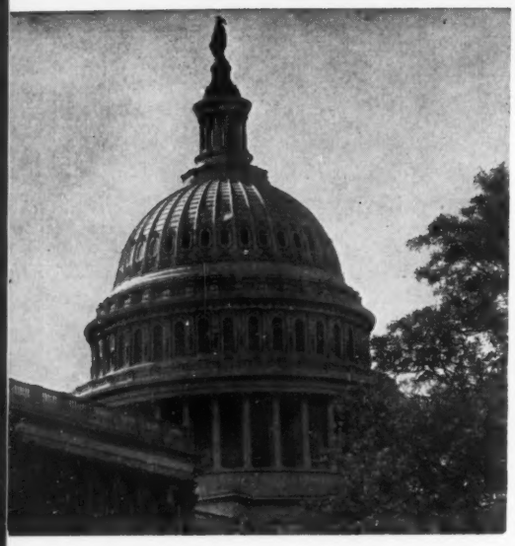

from the Capitol

Washington Bureau Reports

By ROLAND DAVIES & FRED HENCK

WASHINGTON observers expect little change in Eisenhower administration policies under the new Democratic controlled Congress . . . New FCC Chairman explains his regulatory philosophy.

ALTHOUGH there probably will be little difference in the Eisenhower administration's policies under the new Democratic controlled Congress, Washington observers believe that there will be definite effects on the way they are carried out.

Barring some national emergency, the effect of divided control probably will be that relatively little of a fundamental policy nature will be accomplished in the domestic field. Over wide areas of administrative responsibility, of course, Congressional action is not required, and the administration in all probability will move along the same lines it already has followed.

Changes in the approach of the administration to carrying out its policies may stem from the need to win both public acceptance of and wider participation in the administration's activities.

Although the Eisenhower administration has carried out some of its campaign promises in the area of the budget, taxes, reducing government competition and interference with business, it has generally failed to "sell" what it has done and explain its activities to the public. The business and armed services background of many administration officials, understandably, leads them to concentrate on getting the job done and let the public relations department worry about publicizing it. At the federal government level, it is felt by interested persons, such an approach is ineffective in winning public acceptance and ultimately elections, unless the public relations organization is unusually aggressive and competent.

Democratic control of Congress it is felt in some quarters, will virtually force the national Republican leadership to take unnecessary wraps off some projects, give greater attention to its public acceptance, and aggressively lead the way to fuller explanation of its activities.

Although obviously communications matters do not bulk large in the total national political scene, there have been cases in point directly or indirectly involving this field.

One activity, directly in line with administration philosophy and campaign pledges, has been bottled up so far as announcements are concerned despite efforts of a few officials, aware of the importance of making public its worthwhile nature, to bring it out in the open. Another, involving virtually all major businesses, would have reflected substantial credit on industry generally and a business-minded administration, in its delineation of the tremendous future potential of a dynamic national economy, had the administration taken the lead in making it public.

"Another reason why there's always room at the top is that a lot of people who get up there go to sleep and fall off!"

Regulatory Philosophy of FCC's New Chairman

THE REGULATORY philosophy of the Federal Communications Commission's new Chairman, George C. McConnaughey — that some government controls are necessary, but "I believe in having as few government controls as possible" — was spelled out for the first time since Mr. McConnaughey assumed his present post in an address before the Diamond Jubilee of Light civic banquet in Cleveland.

In his initial speaking engagement as FCC Chairman, Mr. McConnaughey keynoted that "Private industry must adapt itself to changing conditions; so, too, must government controlling bodies, if they are to perform their functions effectively."

The FCC Chairman outlined his fundamental belief in free enterprise which earlier, during his service as Chairman of the Renegotiation Board, put him in the forefront of officials of the Eisenhower administration in the exposition of the benefits and responsibilities of private business.

He declared that "Now if I didn't

believe that some government controls are necessary, I can assure you in all honesty that I would not have accepted my present job, the one that preceded it in Washington (as Chairman of the Renegotiation Board), or my former position as Chairman of the Ohio Public Utilities Commission. Yet I can in equal honesty say that I believe in having as few government controls as possible. My firm conviction is that government should exert a minimum of interference with the lives and fortunes of its citizens.

"Why does business exist and why does government exist? Normally, business exists to employ labor and capital to produce and sell goods and services at a profit. And that goes for the young Edisons and Bells and Fords in their little laboratories or bicycle shops, quite as much as the giants like General Electric, AT&T, or the Ford Motor Co. Government exists to make and enforce the ground rules which will enable all its citizens to live together peaceably and prosperously, taking into account public opinion on the one hand and economic facts on the other.

"I can think of few things that our citizens, and government as their agent, ought to want more than successful business — utilities, manufacturing, trade, agriculture, and all the rest. Naturally, we want also to be sure that there is no abuse of power or position, whether against competitors, employes, customers, supplies, investors, or the general public. And that is chiefly why we have controls.

"It is my firm belief, based on experience and observation in Ohio and in Washington, that government should exert the least possible interference with the great productive energies of business in all its phases. What 'the least possible interference' involves is a tough problem for both legislators and regulators to decide. It is perhaps especially difficult in public utility control.

"Public utilities have certain natural and inevitable monopolistic characteristics, and government has rightly decided that such elements of monopoly are in the public interest, because competition in utility plants and services makes for wasteful duplication of resources, and other evils. In return for granting monopoly franchises, our state governments reserve the right to set or approve rates and

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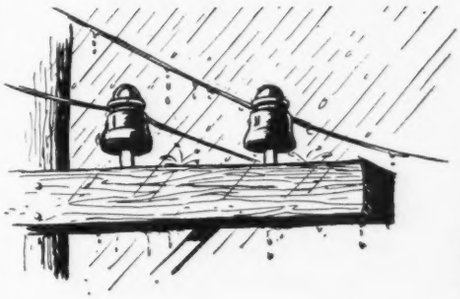

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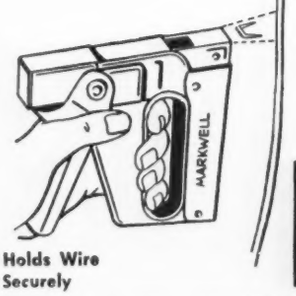

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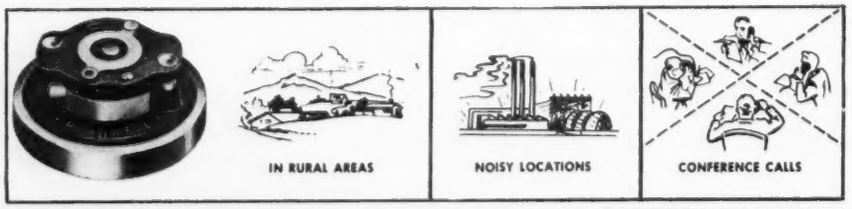

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to enforce certain rules which fully protect the interests of the utilities' customers and investors.

"This system works admirably, because it is based on principles which are both realistic and just. The public interest is on the one hand served by the full force of private initiative and private investment, and on the other protected by alert government regulation which prevents abuse of private freedom."

Tracing the kinship of electricity and Thomas Edison's research with electronics and communications, Chairman McConnaughey recalled the story of how the Prime Minister of England visited Michael Faraday, 19th century English pioneer in electrical research, and after viewing a dynamo asked, "Will I be able to tax it?" The FCC Chairman added that 100 years later, a like-minded Prime Minister might have also asked, "And how shall we control it?"

Mr. McConnaughey commented that "Some of his government contemporaries, in England and even — for a time — here in America, would have objected that even control was not enough without absolute ownership and operation, whether achieved by legislative expropriation or by tax-free, tax-supported confiscation under the guise of 'competition.'"

The FCC Chairman pointed out the impact of national defense on communications, adding that ""We know now that the greater the advances in electronics, the more controls will be needed in this field of national defense. The bigger the role that defense considerations play, the more wisely the Commission must function."

NLRB Jurisdiction

IN A SERIES of rulings, the National Labor Relations Board has issued the first decisions applying its new jurisdictional standards in specific cases. The standards were applied in eight cases, all involving petitions for representation elections among employes, including one in the public utilities field.

The NLRB first announced jurisdictional standards last June 30, but actual application awaited the specific cases now before the board. The general policy was aimed at removing many small companies from the authority of the Taft-Hartley Act.

In the utility case — involving the

Tele-views

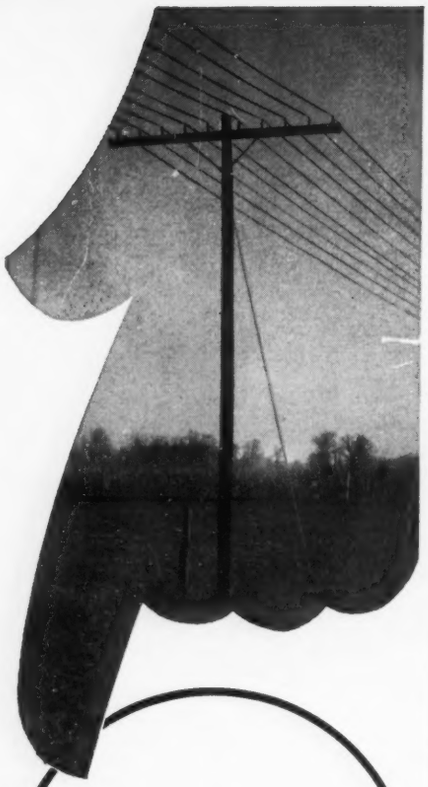
The appointment of OTIS CAMPBELL to eastern division manager for General Telephone Co. of California has been announced by Edwin M. Blakeslee, president of the company. Former plant superintendent in the eastern division, Mr. Campbell succeeds G. H. Briggs who has been promoted to a new staff position with General Telephone Corporation in New York.

Mr. Campbell, whose duties will be performed in the Pomona, Covina, Ontario and San Bernardino exchanges, which comprise the firm's eastern division, has a background of more than 26 years of telephone experience. He began his telephone career in 1928 with the Pomona Valley Telephone & Telegraph Union which was incorporated into General's system in 1932.

NEW BUILDING: — The Jacksonville, Ill., exchange, which has grown to 8,000 stations, will be converted to automatic operation next year by the Illinois Telephone Co. First earth recently was turned, as construction of the new building was begun, by J. F. VAN DE VUSSE, of Bloomington, president of the company, and MAYOR ERNEST L. HOAGLAND. Pictured at the ground-breaking ceremony are JOHN G. PRICKETT, secretary of the Chamber of Commerce; MAYOR HOAGLAND; PRESIDENT VAN DE VUSSE; WILLIAM O. RANDALL, district manager of the telephone company; DEAN HILFINGER, Bloomington architect, and HUGH GIBSON, of Jacksonville, general contractor. The new building will be an attractive one of the most modern construction and functional design, fashioned of reinforced concrete and brick. It will be of two stories, with a full basement, and will be air conditioned throughout. The overall cost of the project will be approximately $1,500,000.

STAKING CREW at work laying out pole line routes for new construction by Grand River Mutual Telephone Co., Princeton, Mo. Studying map in left foreground are (l. to r.): LOWELL MOORE, BUDDY HICKS, and VENE MILLER. AL McDANIEL is handling the flag. In background are (l. to r.): BILL FAIR, RAY WESTCOTT, and DUANE NIBLE.

New automatic equipment of Union Telephone Company's Clinton, Mich., exchange is housed in the attractive building shown above.



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Muncie, Indiana

Greenwich, Conn., Gas Co. — the board stated: "We have determined that in future cases the board will assert jurisdiction . . . over local public utility and transit systems affecting commerce whose gross value of business is $3,000,000 or more per annum."

This standard would remove from NLRB jurisdiction a number of small Independent telephone companies throughout the country.

Southern Democrat May Be Named to FCC

THE APPOINTMENT of a successor to Miss Frieda B. Hennock — whose term on the Federal Communications Commission expires next June 30 — is most likely to be a woman Democrat, probably from the South, it has been indicated authoritatively. There are already four Republicans on the FCC, the maximum for one party permitted under the Communications Act.

A leading possibility for the FCC appointment under consideration is understood to be Mrs. Rutherford of Nashville, Tenn., Executive secretary of the Tennessee State Funding Board.

She previously had served, from 1943 to January, 1953, as a staff member of the Tennessee Railroad & Public Utilities Commission and as administrative assistant to three general counsels of the commission, including Governor Frank Clement.

Statement of the Ownership, Management and Circulation Required by the Acts of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233)

of Telephone Engineer & Management, published monthly at Rochelle, Illinois, for October 1, 1954.

1. The names and addresses of the publisher, editor, managing editor and business managers are:

Publisher—Telephone Engineer Publishing Corp., 7720 Sheridan Road, Chicago, Ill.

Editor Ray W. Smith, 7720 Sheridan Road, Chicago, Ill.

Managing Editor—John G. Reynolds, 7720 Sheridan Road, Chicago, Ill.

Business Managers, Ray W. & Roy F. Smith, 7720 Sheridan Road, Chicago, Ill.

2. The owner is: (If owned by a corporation, its name and addres must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addrsses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Telephone Engineer Publishing Corporation, 7720 Sheridan Road, Chicago 26, Ill.

Ray W. Smith, 7720 Sheridan Road, Chicago 26, Ill.

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3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: **(If there are none, so state.)**

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4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

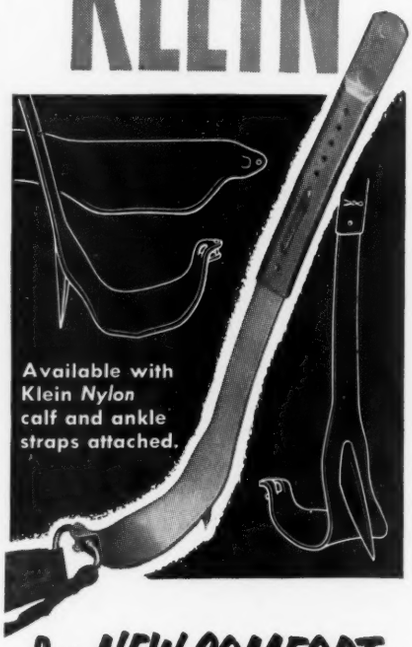
Ray W. Smith, Editor

Sworn to and subscribed before me this 30th day of September, 1954.

W. R. Davis, Notary Public

(My commission expires August 30, 1955)

Look to the Leader
KLEIN



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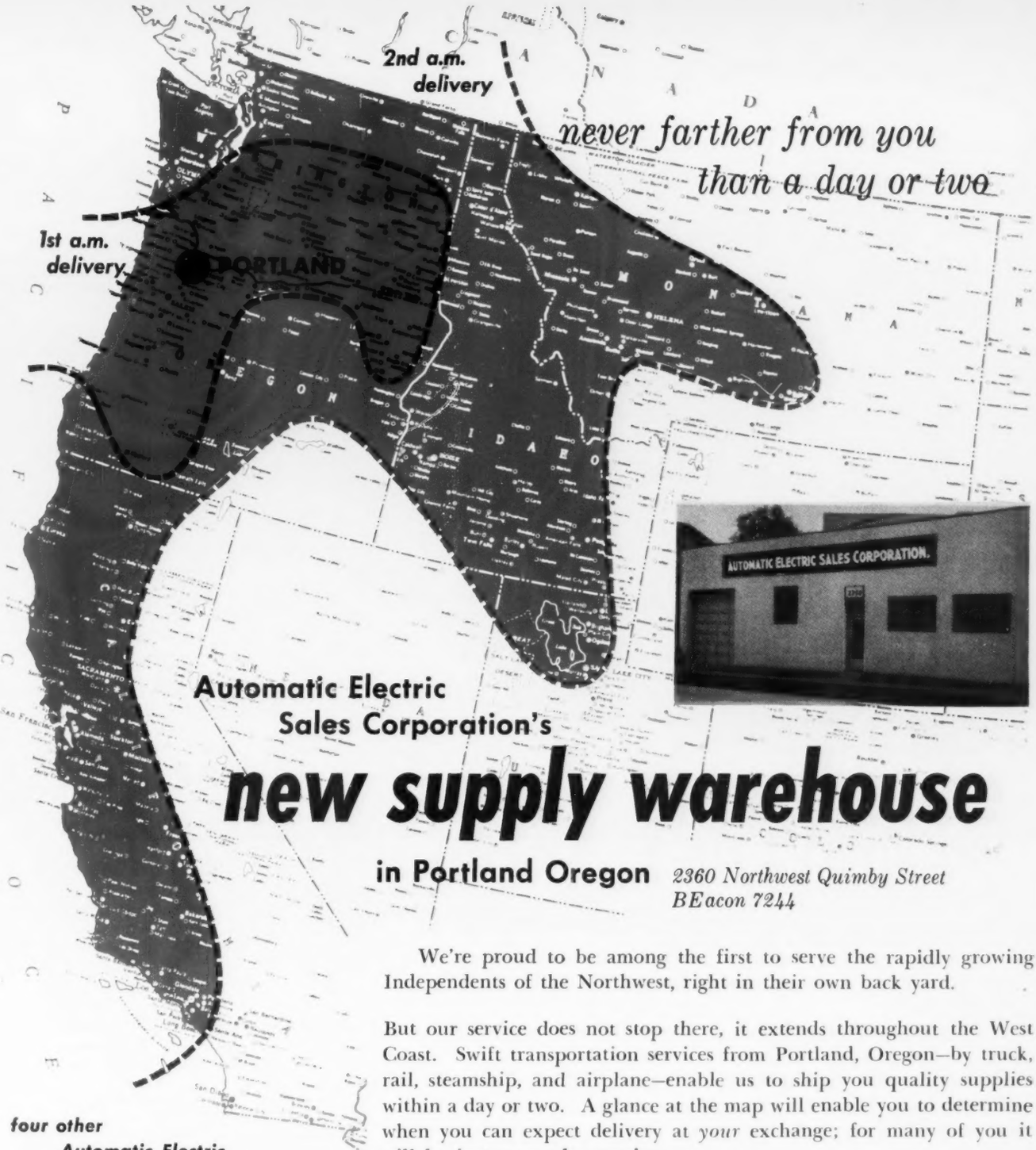

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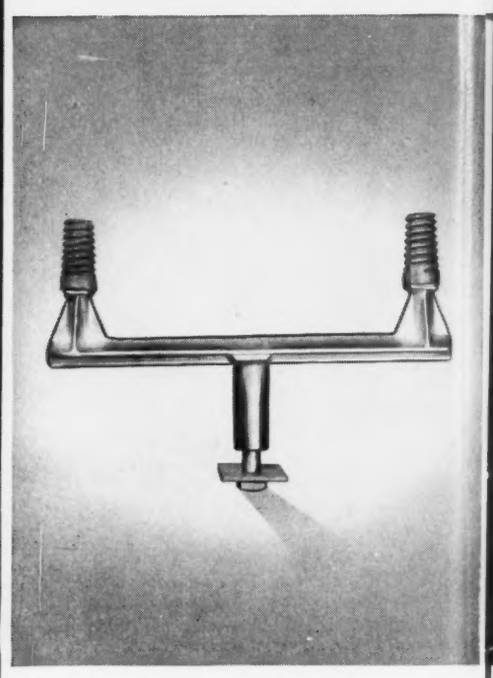

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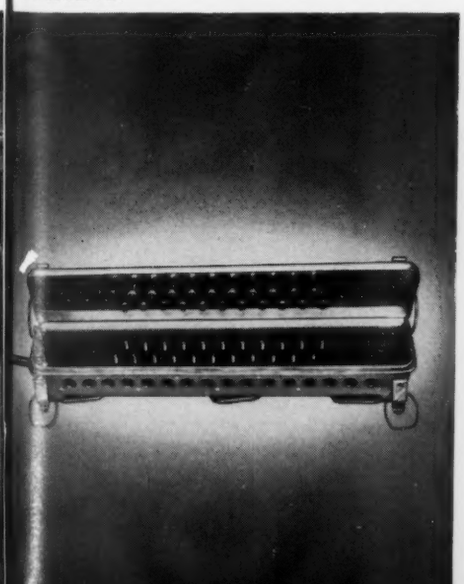

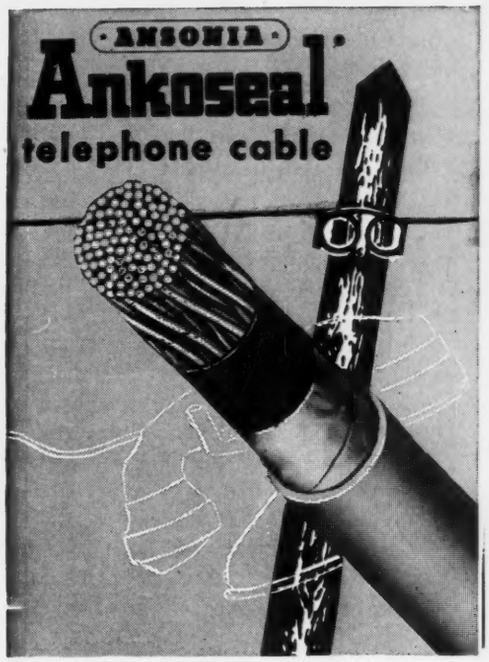

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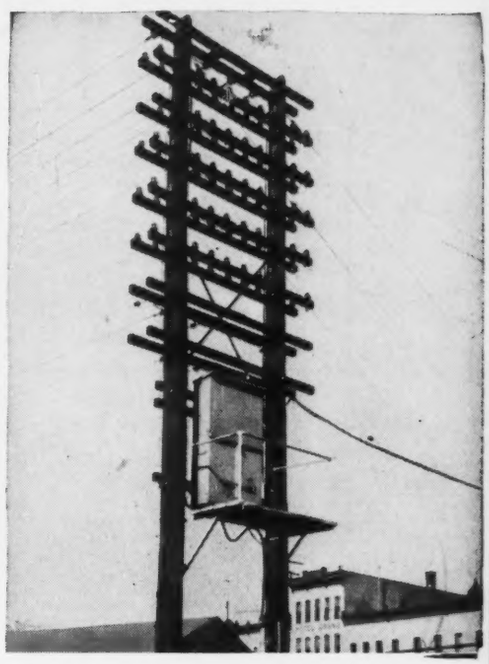

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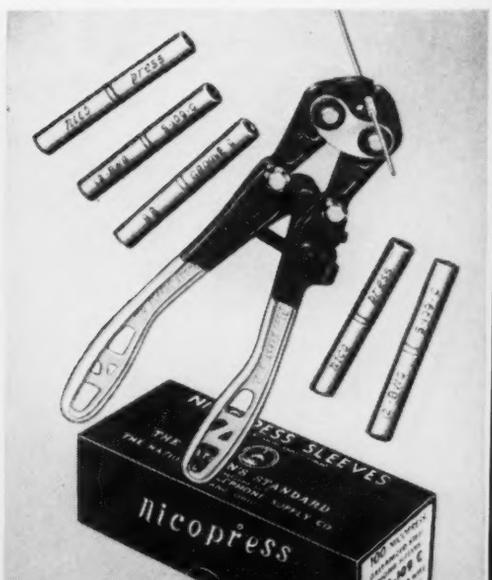

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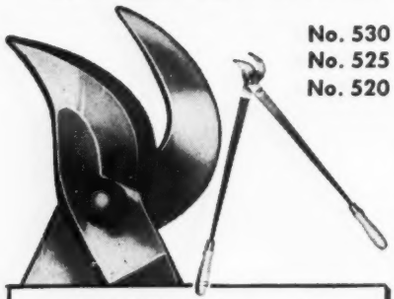
Now two great names combine in the world's finest long handled pruner.



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Central Tel. Purchases Common Stock of Iowa Co.

CENTRAL TELEPHONE Co. has announced that pursuant to its offer which terminated October 15, more than 80% of the Common Stock of Fort Dodge (Ia.) Telephone Co. has been acquired for cash.

Fort Dodge Telephone Co., which serves the city of Fort Dodge, Iowa (Population 27,000) and environs, has more than 12,500 company-owned telephones in service, has no funded debt and has less than $500,000 of 5% Preferred Stock outstanding.

Copperweld Steel Wins "Oscar" Award

IN THE FINAL ratings of the board of judges in the "Financial World" survey of annual reports, Copperweld Steel Co., was judged as having the best annual report of the Small Steel Companies. The bronze "Oscar of Industry" was presented to Frank R. S. Kaplan, president of the company, at the Annual Awards Banquet in the Grand Ballroom of the Hotel Statler, New York, October 25, 1954.

A total of 5,000 annual reports were considered this year in the international competition, the 14th in the series of surveys. These were judged in 100 industrial classifications for the Best-of-Industry awards.

Kellogg Names New Alaska Representative

KELLOGG SWITCHBOARD & Supply Co. has announced that Mrs. John F. Gorsuch, of Anchorage, Alaska, has been appointed Kellogg Sales Agent in Anchorage, Palmer, Seward, Cordova and several other cities in the 3rd Judicial Division of Alaska.

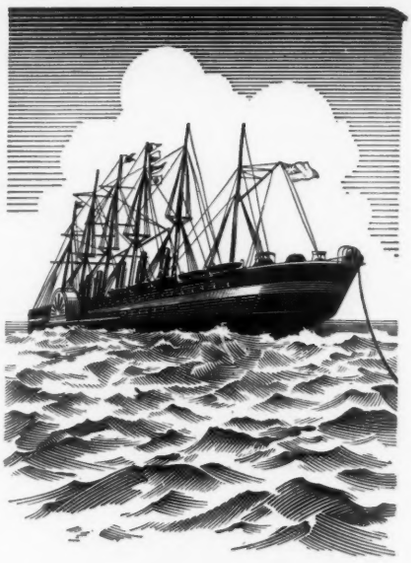
Mrs. Gorsuch, who is well known throughout Alaska for her civic, charitable and political activities in Alaska, is the widow of the late John F. Gorsuch who was a Territorial Senator in Alaska in addition to his other responsibilities.

John Gorsuch represented Kellogg in Alaska during the past several years.

Automatic Electric Opens Portland, Ore., Warehouse

A NEW TELEPHONE supply warehouse was opened in Portland, Ore., on November 15, Automatic Electric Sales Corp., Chicago, has announced.

The growing importance of the Independent telephone industry in the Pacific Northwest region led to the



Spanning the Ocean

July 27, 1866 marks a famous day in communication history. For, after four failures, the Atlantic cable was permanently completed from Valentia, Ireland, to Trinity Bay, Newfoundland. Merchants in Chicago and New York were only minutes, rather than weeks, away from merchants in London and Amsterdam.

It is significant to note that the first Hemingray Glass Insulators were made in this same era. In fact, for 84 years now, Hemingray has been dependably serving the communication systems of the world.

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decision to locate a warehouse in this area, the announcement stated.

According to Automatic Electric officials, the new facility will provide quicker and more efficient service to Independent companies in the region, and at the same time permit fast, convenient deliveries.

The new warehouse, which will be located at 2360 Northwest Quimby St., in Portland, will be managed by Edward Chok, formerly manager of Automatic Electric's Los Angeles, Calif., warehouse.

12-Year Old Girl Installs Cable Terminal

WORKING ALONE, Carolyn Hardy, a 12-year old student of Collidge School, San Gabriel, Calif., recently installed a C-3, 11-pair Channell Cable Terminal on 26-pair, self supported, alpeth cable in 37 minutes.

According to J. W. Channell, president of Channell Cable Splicing Machine Co., El Monte, Calif., the complete box score record made by Miss Hardy was as follows:

	Started	Completed	Time
Opening cable	3:00 PM	3:02 PM	2 Min.
Sealing ends	3:02 PM	3:06 PM	4 Min.
Securing faceplate	3:06 PM	3:08 PM	2 Min.
Identifying & Terminating	3:08 PM	3:23 PM	15 Min.
Clearing & Sleeving 15 pair	3:23 PM	3:28 PM	5 Min.
Sealing faceplate	3:28 PM	3:37 PM	9 Min.
		Total	37 Min.

Stromberg-Carlson Names Harmon to New Post

C. LOWELL HARMON has been appointed sales engineer to work out of the San Francisco office, according to T. C. Thompson, sales manager of the Telephone Division of Stromberg-Carlson Co. Mr. Harmon joined Stromberg-Carlson in 1951 as a junior engineer, then advanced to the positions of senior engineer and junior sales engineer. He was born in Junction City, Kans., and after early schooling in Brookfield, Missouri, attended the Indiana Technical College at Ft. Wayne where he earned his B.S. degree.

C. L. HARMON

His military service during the war years was in the capacity of chief radar operator with the U. S. Army. Before coming to Stromberg-Carlson he gained engineering experience with the Home Telephone & Telegraph Co., Ft. Wayne, Ind.

I. J. Klass Retires From L. M. Berry & Co.

AFTER 32 YEARS association with L. M. Berry & Co. in the telephone directory business, Irvin J. Klass took the momentous step on September 1st of retiring from the business. Up to that time Mr. Klass had held the position of Western Manager with offices in Dayton, Ohio. He had joined the company in Rochester in 1922. In the August issue of the company "Spotlite" his life was portrayed in which the following tribute was paid: "His 32 years of service with L. M. Berry & Co. have been pioneering, meritorious, and distinguished. His record and ability as a salesman, plus the life-long effort and devotion, truly mark . . . salesman extraordinary!"

I. J. KLASS

While he has disassociated himself from the directory business, he does not intend to slip into a life of leisure. He plans to devote much of his "retirement" time in Dayton to some of his business enterprises in which he has been interested for some time. He is president of the Ames Theatre, president of Klee Theatre Enterprises, president of the M & N Realty Co., and executive vice president of Synthetic Vision Corp. which has developed an improved system for projecting 3-D movies. His newest venture has been in real estate, and he hopes to act as a consultant for the Fels Co. in the development of acreage for new homes.

Raytheon Announces New Long-Distance Device

THE RAYTHEON Manufacturing Co., Waltham 54, Mass., has announced production of the new equipment which uses a "bee-line beam" to carry voice messages across 50 miles without wires. According to Raytheon, the electronic beam, which cannot be disrupted by hurricanes, ice storms, static, or other common forms of interference, shoots across

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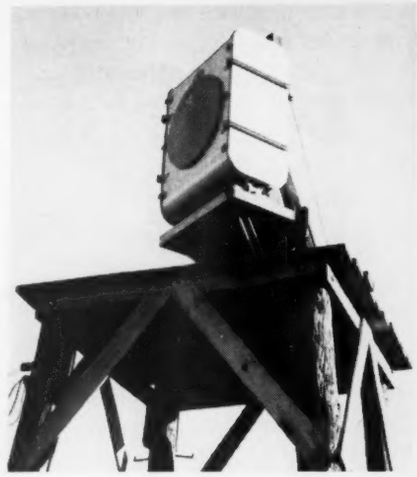
rugged mountain terrain, over rivers and across wild timber lands, to bring telephone service from the nearest point on a "main line" or central exchange, to isolated villages or small communities that have never had telephone facilities.

Raytheon's new device, the TCR-12, is a microwave relay system designated the "Telelink." According to Raytheon spokesmen, it is the lowest-priced unit of its type ever developed. Consisting of a simple-looking metal box with a cable which is connected to ordinary 110-volt household current, it may be mounted atop a pole or tower, or placed on a rooftop, with its built-in aluminum "dish" or antenna. This antenna is aimed at the "dish" in the identical unit, located as far as 50 miles away. When the current is turned on, an extremely slim microwave beam links the two units, transmitting telephone messages that are notable for reception that is clear, strong and lifelike — far superior to conventional wire connections.

In addition to carrying the actual voice messages, the microwave system provides full selective ringing. When someone from the "outside world" dials one of these numbers, the signal is carried into the village via microwave, and routed to the individual telephone. When that telephone rings, no other instrument on the system rings. There is no need, therefore, for the usual rural ringing codes of "one long and two short," etc. Because there are two channels, the system permits two 2-way conversations at once.

The "Telelink" is completely enclosed in a watertight metal box containing its own thermostat-controlled ventilating system. It is installed outdoors, and operates unattended, in subzero winter gales or in the broiling summer sun — month after month and year after year, with minimum chance of interruption in service.

Forestry officials have shown considerable interest in the equipment, and engineers of the Waltham, Mass., electronics firm have predicted that it will become a practical necessity in municipal, state highway, and similar applications. They revealed that another microwave system is soon to be introduced, a unit specifically designed for use in industrial applications of voice communication, facsimile, telegraph, telemetering and control circuits.



Shown above is the small, compact, weather-tight box containing Raytheon's new microwave telephone link. When aimed at similar unit up to 50 miles away, a microwave beam establishes communications for as many as 20 telephones.

One useful feature of the "Telelink" is the fact that it can be installed in either of two ways: the box can be mounted on an elevated point for direct transmission to a distant point; or, it can be placed at the foot of a pole or tower, and the beam directed straight up at a reflective-type antenna, inclined at a 45-degree angle. The beam is bent at right angles and shoots out toward its target. This "periscope" installation permits easy access to the box for adjustment or repairs.

Outstanding features are long life, small size, ease of installation, freedom from static and other interference, and low average cost per installation. The "Telelink" marks Raytheon's entry into the field of telephone communications.

Already a leader in microwave relays for television, Raytheon is the world's largest maker of marine radar and is renowned for its marine navigation systems and communications devices.

Exide Advances Leet and Keeg

PROMOTION OF two sales executives has been announced by Exide Industrial Division of The Electric Storage Battery Co. Charles H. Leet, Pittsburgh branch manager since 1949, has been transferred to the firm's larger Chicago office as assistant branch sales manager. R. L. Keeg, formerly branch sales engineer at

Please Turn To Page 98

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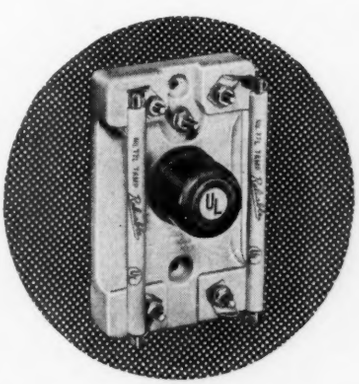

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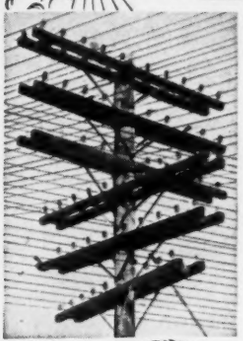

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Pittsburgh, succeeds Mr. Leet as branch sales manager there.

Mr. Leet joined Exide in 1938 as a sales engineer with its Pittsburgh Branch, and was appointed manager there in August 1949. A Cornell University graduate, he is a member of American Society of Electrical Engineers, Association of Iron and Steel Engineers, and Engineering Society of Western Pennsylvania. Leet also is secretary of Pittsburgh Chapter, American Material Handling Society.

Mr. Keeg was employed by Exide in 1951 as a Pittsburgh branch sales engineer. A member of American Material Handling Society, he graduated from University of Pittsburgh with a degree in electrical engineering.

Evers Succeeds Boswau As Leich Chief Engineer

Hans P. Boswau, vice president and chief engineer of The Leich Electric Co., retired from active duty on October 31.

According to Leslie H. Warner, Leich's president, Mr. Boswau, the inventor of the Leich Dial System, will continue his development work for Leich in a consulting capacity.

Harry G. Evers, formerly assistant chief engineer, has been appointed to the position of chief engineer succeeding Mr. Boswau. Mr. Evers has been with Leich since 1949 and is a veteran of over 25 years in the Independent telephone field. He is recognized as one of the outstanding circuit engineers in the communications industry.

From 1944 until he joined Leich, Mr. Evers was associated with the Federal Telephone & Radio Corp. He was incharge of setting up its testing bureau and inspection standards. He also did development work in the design of private and community dial systems as well as special switchboards for the armed services.

Before joining Federal, Mr. Evers was employed by the Automatic Electric Co. There he spent 10 years in various phases of engineering inspection including relay design, circuit testing and apparatus life tests. Then for 11 years, Mr. Evers worked on circuit design. His circuit design work included projects on interconnection with foreign systems, relay switchboard designs, switchboards for the Bell System and special control equipment for the Armed Ser-

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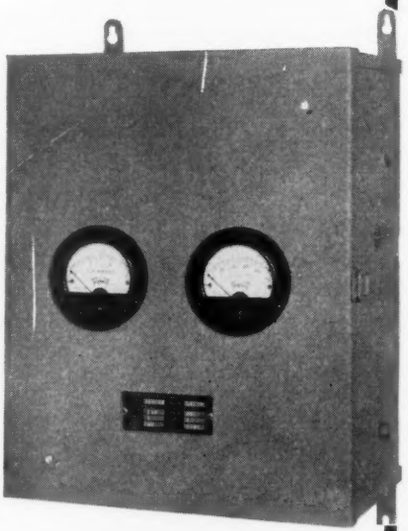

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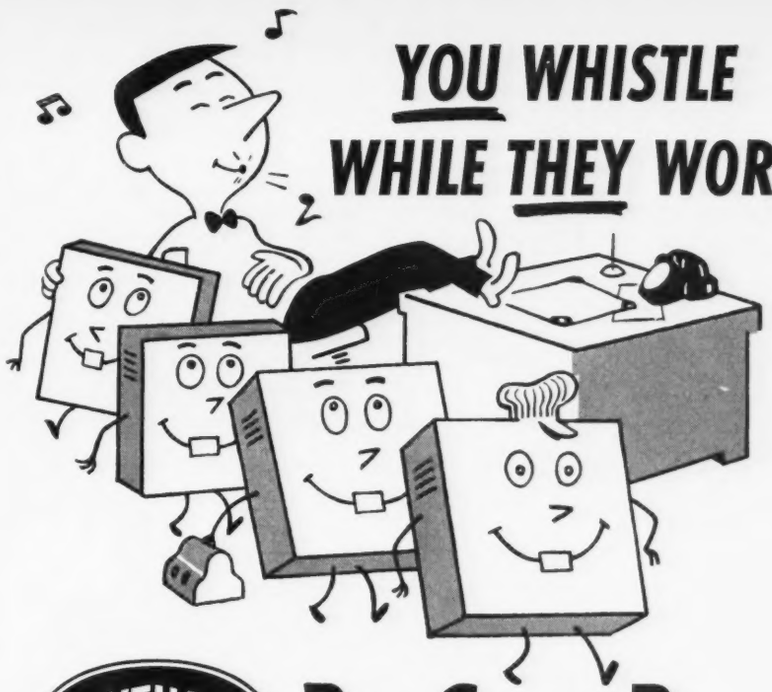
HANS P. BOSWAU, retiring from active duty as Vice President and Chief Engineer of the Leich Electric Company.

vices including early drone plane controls.

Mr. Boswau joined Leich Electric Co. as chief engineer in 1945 and has long been recognized as one of the finest development engineers in the telephone industry. Over 500 Leich Dial Systems, (his invention), are now in service or on order. Mr. Warner stated that the whole industry should be glad to know that Mr. Boswau's technical knowledge will still be available, since he intends to do further work for Leich in the development of new equipment.

Mr. Boswau's telephone career began with the physical laboratory of the Western Electric Co. (now Bell Telephone Laboratories). He then spent several years as a development engineer with European Manufacutr-

H. G. EVERS, new Leich Chief Engineer.



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ers. Here he worked on manual and dial switchboards, intercommunicating systems, PBX's and other telephone apparatus. Upon his return to the United States, Mr. Boswau engineered dial exchanges for the Automatic Electric Co. and later became acting chief engineer for the North Electric Co.

Then, as chief engineer for the Lorain County Radio Corp., Mr. Boswau worked on the design and production of what is said to be one of the world's finest radio-telephone systems, serving more than 600 cargo vessels on the Great Lakes.

Mr. Boswau now holds 23 U. S. patents relating to radio and telephone apparatus and circuit control.

New Training Film Released by Buckingham

BECAUSE OF the great demand for material to be used for instruction in the use and care of linemen's equipment, the Buckingham Manufacturing Co., Inc., 7 Travis St., Binghamton, N. Y., has produced and is making available to all interested people a film on the care and use of linemen's equipment. This film is entitled the "Lifeline of the Linemen." It is available for 35 MM sound slide equipment and 16 MM sound movie equipment.

The film is available either directly from the Buckingham Manufacturing Company or its distributors on a loan or purchase basis.

Leich to Distribute Multi-Matic Products

MULTI-MATIC CORP., Van Nuys, Calif., has announced the appointment of Leich Electric Co., 427 W. Randolph Street, Chicago, as Midwest stocking agency for the company's Super Hole-A-Matic portable, one-man operated diggers and the Gen-A-Matic portable gas engine generators.

Leich will service Independent telephone companies who are prime users of Multi-Matic products, for the company's portable post hole boring equipment for line installation and maintenance work and the Gen-A-Matic which powers all necessary equipment.

Announcement has been made by J. H. Barnett, Jr., general sales manager, Reilly Tar & Chemical Corp., of the appointment of ROBERT S. HINKLE as a member of the company's Protective Coating Sales Group. A recent graduate of the University of Illinois where he was a member of the Sigma Alpha Epsilon Fraternity, Mr. Hinkle served with the U. S. Army Air Force in the European Theatre of Operations during World War II. He will have his headquarters in Granite City, Ill., where he will be associated with the Reilly group headed by E. E. Goodman, district manager.

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BELTS — CLIMBERS — COMPLETE LINEMEN'S EQUIPMENT, *W. M. Bashlin Co., Bashlin Bldg., Grove City 1, Pa.*—[ADV. 3]

BELTS — CLIMBERS — PLIERS — SAFETY STRAPS — CONSTRUCTION TOOLS. *Klein & Sons, Mathias. 3200 Belmont Ave., Chicago 18, Ill.*—[ADV. 4]

BOOTHS—Acoustic Telephone — *Sherron Metallic Corp., 1202 Flushing Ave., Brooklyn 6, N. Y.*—[ADV. 5]

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CABLE, All Plastic, *Aerial, Duct, Direct Burial, PBX, Switchboard. — The Ansonia Wire & Cable Co., Ansonia, Conn.*—[ADV. 7]

CLIP — Modern Lineman's Needle Clip. Free catalog #AA588 and free samples from: *Mueller Electric Co., 1588AA E. 31st St., Cleveland 14, Ohio.* [ADV. 8]

CORDS, Switchboard (with or without plugs), Instrument (retractable and regular) and Operators — *Commercial Cord & Supply Co., Inc., 26 Main St., Clifton Springs, N. Y.*—[ADV. 9]

CORDS, Switchboard & Telephone — *Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago 41, Ill.*—[ADV. 10]

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FURNACES — For quickly and economically melting lead and paraffin — *Mutual Liquid Gas Equipment Co., Inc., 3600 W. Imperial Highway, Los Angeles, Calif.*—[ADV. 12]

INSULATORS, Porcelain — *Porcelain Products Inc., Box 300, Findlay, Ohio.*—[ADV. 13]

LIGHTWEIGHT PULLERS — *Coffing Hoist Company, 800 Walters St., Danville 5, Ill.*—[ADV. 14]

PIPE PUSHERS — *Giant Manufacturing Co., South 6th St., at 12th Ave., Council Bluffs, Iowa.*—[ADV. 15]

POLE HOLE DIGGERS — *For derrick mounted trucks. Tele-E-Lect Products, Inc., 9613 Minnetonka Blvd., Minneapolis 16, Minn.*—[ADV. 16]

POLES, Southern Yellow Pine — *Colfax Lumber & Creosoting Co., Inc., P. O. Box 23, Pineville, La.*—[ADV. 17]

POLES, Southern Yellow Pine — *Taylor Colquitt Company, 290 E. Main St., Spartanburgh, S. C.*— [ADV. 18]

POLES, Southern Yellow Pine — *Texas Creosoting Co., Orange, Texas.*—[ADV. 19]

PROTECTIVE EQUIPMENT — *Reliable Electric Company, 3145 Carroll Avenue, Chicago 12, Ill.*—[ADV. 20]

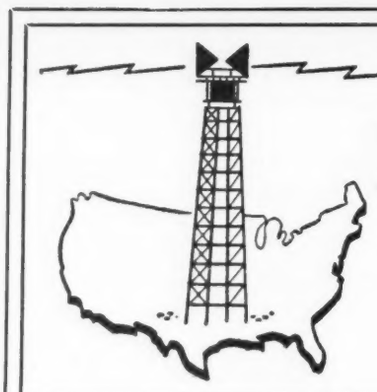
REBUILT TELEPHONE & SWITCHBOARDS — *Telephone Repair & Supply Company, 1760 Lunt Avenue, Chicago 2, Ill.*—[ADV. 21]

TRUCK BODIES — *Highway Trailer Co., Edgerton, Wisc.*—[ADV. 22]

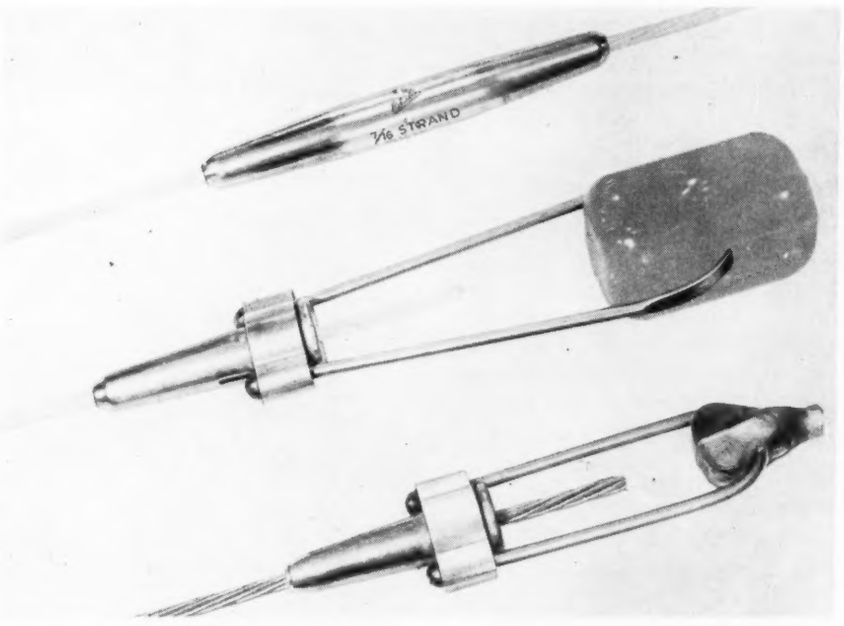
WIRE, Insulated — DATED DROP WIRE — Neoprene or Weatherproof — *Alphaduct Wire & Cable Co., Milltown, N. J.*—[ADV. 23]

WIRE, Insulated Drop and Bronze or Copperweld — *Acorn Insulated Wire Co., Inc., 36 Freeman St., Pawtucket, R. I.*—[ADV. 24]

WIRE, Telephone, *for all inside and outside uses — Whitney Blake Co., New Haven, Conn.*—[ADV. 25]



NEW PRODUCTS' SHOWCASE



STRANDLINK & STRANDVISES:—Strandlink and Strandvise, which have become universally accepted for splicing and deadending steel strand messenger, static and guy wires in an unprecedented short period of time, are now manufactured for 7/16" strand. Previously, these Reliable Electric Co. items were available only for 1/4", 5/16" and 3/8" strand.

The manufacturers early claims of noteworthy savings in material costs and installed costs, plus speed of assembly far exceeding any other method of splicing and deadending, is being thoroughly substantiated in every branch of the telephone and power fields.

As is so often the case, the secret of high efficiency and low cost of these items lies

SEND IN THIS COUPON FOR MORE INFORMATION

Telephone Engineer Publishing Corp.
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Please forward complete information on the following products and services described in the November, 1954 issue of TELEPHONE ENGINEER & MANAGEMENT (Check Information desired.)

NP 676 ____ NP 677

SERVICES AND SUPPLIES

ADV. 1 ____	ADV. 2 ____	ADV. 3 ____	ADV. 4 ____	ADV. 5 ____
ADV. 6 ____	ADV. 7 ____	ADV. 8 ____	ADV. 9 ____	ADV. 10 ____
ADV. 11 ____	ADV. 12 ____	ADV. 13 ____	ADV. 14 ____	ADV. 15 ____
ADV. 16 ____	ADV. 17 ____	ADV. 18 ____	ADV. 19 ____	ADV. 20 ____
ADV. 21 ____	ADV. 22 ____	ADV. 23 ____	ADV. 24 ____	ADV. 25 ____

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Company _____

Street Address _____

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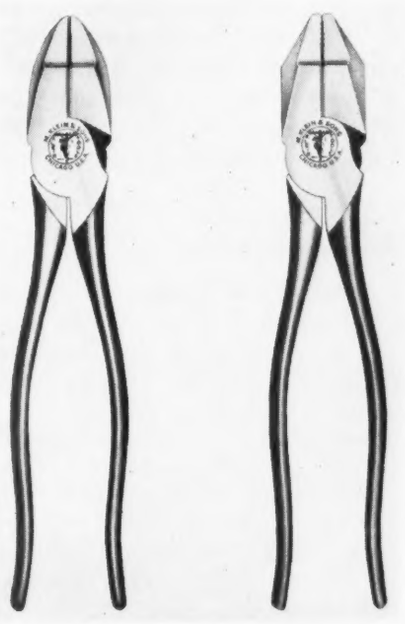
largely in their design simplicity. The design feature of both the Strandlink and Strandvise is the gripping chuck which is housed in a heat-treated aluminum alloy tube. These chucks have several hundred case-hardened plated steel teeth, per set. The bails of the Strandvise are type 304 stainless steel. Holding power is said to surpass the ultimate strength of standard steel strand, irrespective of grade.

The manufacturer urges all those interested in splicing and deadending steel strand messenger, static and guy wires, who are not familiar with the merits of these two items, to write for samples and complete information. Requests should be addressed to A. F. Leach, Reliable Electric Co., 3145 Carroll Ave., Chicago 12, Ill., or complete data may be obtained by checking New Product 676.



CUTTING PLIER: — Mathias Klein & Sons, 700 McCormick Rd., Chicago 45, Ill., now offers a new lineman's plier designed especially for clean and easy cutting of insulated and hard drawn bare wire. High leverage is provided without extra hinging, thereby eliminating the need for widespread width of the handles. This new tool also serves as a regular side-cutting plier.

The plier measures approximately nine inches overall and opens to accommodate #2 weatherproof hand-drawn solid copper wire. It will also cut A.C.S.R.

Like other Klein Pliers, the high leverage lineman's plier is forged from high-grade tool steel, individually fitted, tempered, adjusted and tested. Available in either regular or N.E. (streamlined) patterns. Refer to No. 213-9 for standard plier. Refer to No. 213-9NE for plier with streamlined head.—For complete data, Check New Product 677.

For complete information on the products and services described in this department send in the coupon which appears on this page. If you do not see a listing of the products and services that you are interested in, write BUYER'S GUIDE, 7720 N. Sheridan Road, Chicago 26, Ill. The information will be furnished quickly and without charge to telephone industry members.

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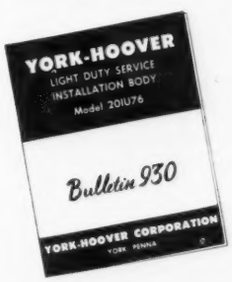

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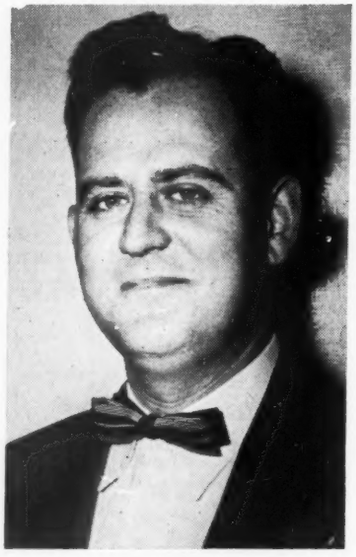
Kellogg Announces Two Appointments

O. C. BAILEY, assistant sales manager, Kellogg Switchboard & Supply Co., Chicago, Ill., has announced the appointments of C. E. Brown as Central division manager with headquarters in Mansfield, Ohio, and C. F. Cheney to succeed Mr. Brown as Chicago division manager. Mr. Brown's first post with Kellogg was in 1919 with the Kansas City branch. Later he served as division manager of the company's branches in Kansas City, Mo., San Francisco, Calif., and Columbus, Ohio. In 1944, he was appointed supply sales manager in Chicago and in 1952 was made Chicago division manager, a position he has held until his present appointment. In his new post, he will be in charge of the company's selling and warehousing operations in Ohio, West Virginia and portions of Michigan, Pennsylvania and Maryland.

C. E. BROWN

Mr. Cheney has been Central Division Manager in Mansfield, Ohio, since 1953. Before joining Kellogg in 1949, he spent three years in the Long Line Department, American Telephone & Telegraph Co. and three years with the Wisconsin Telephone Co. in engineering. He is a graduate of the University of Wisconsin and has a Bachelor's Degree in Electrical Engineering. Mr. Cheney will direct the firm's selling and warehousing operations in Illinois, portions of Wisconsin, Michigan and Indiana.

C. F. CHENEY



National Pneumatic Co., Inc., and Holtzer-Cabot Divisions, Boston, Mass., have announced the appointment of JAMES J. ANDERSON as general sales manager. Mr. Anderson will be in charge of sales for the following company divisions: Holtzer-Cabot Telephone Equipment, Holtzer-Cabot Motor, Government Contracts, Transit and Railroad, Industrial Actuators and Controls, Automatic Door, and International Sales. In addition, Mr. Anderson will be responsible for the company's advertising and sales service divisions. He has been associated with the Holtzer-Cabot Telephone Equipment Division as manager of the Chicago plant and sales manager for the past six years.

Highway Trailer Advances Stricker

HAROLD J. MEAGHER, president of the Highway Trailer Co., Edgerton, Wis., has announced the promotion of Henry C. Stricker, Jr., to the position of chief engineer.

Mr. Stricker received his engineering training at the University of Wisconsin and the University of Belfast, Ireland. After three years of army service with the Corps of Engineers, he joined the Highway Trailer engineering staff in 1946.

Remington-Rand Issues New Bulletin

VISIBLE, FAST reference of names and other necessary information at telephone switchboards is described in a new 4-page, illustrated folder recently released by Remington Rand Inc.

A new, simplified, compact and flexible method for finding information, at finger-tip, at PBX switchboards — "Speedac Chaindex Reference Unit" — improves telephone service both on incoming and outgoing calls. Executive and secretarial time formerly spent in "holding the line" is eliminated.

According to Remington Rand, telephone company switchboards, using the "Speedac Multi Card Bulletin Holder Unit," a keyshelf directory unit, secure substantial dollar savings in traffic operating expense and in circuit holding time, plus higher percentages in local call completions. In general, this Unit aids

the progress of toll dialing programs.

Complete descriptions of both Units and specifications are outlined in folder KD767. Copies can be obtained at any Remington Rand sales office in all principal cities or by writing Remington Rand Inc., 315 Fourth Ave., New York 10, N. Y.

Clemens Named Assist. Comptroller of Kellogg

JOHN CLEMENS has been appointed assistant comptroller of the Kellogg Switchboard and Supply Company, a Division of International Telephone and Telegraph Corp., 6650 S. Cicero Ave., Chicago, according to a report issued by S. H. Bass, comptroller.

Mr. Clemens, who took over his new position recently, was associated with George Rossitter and Co., Certified Public Accountants, of Chicago, for 11 years prior to joining the Kellogg Company.

Rundle and Mohr Join Kellogg Swbd.

O. C. BAILEY, assistant sales manager of Kellogg Switchboard & Supply Co., a Division of International Telephone & Telegraph Corp., has announced the appointments of F. A. Rundle and K. W. Mohr as field representatives.

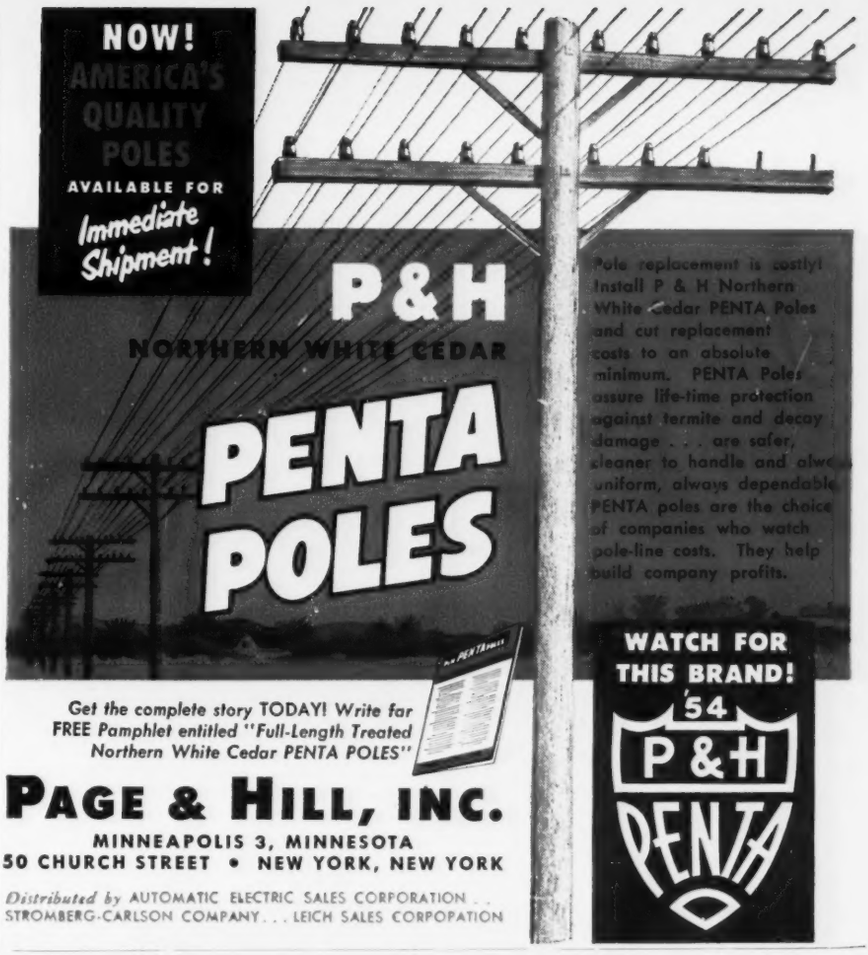
Mr. Rundle has been assigned to the Kellogg Company's Western Di-

F. A. RUNDLE

K. W. MOHR

vision under E. R. Sears, division manager. He will represent Kellogg in Washington, Idaho and Western Montana, with headquarters temporarily in Portland, Oregon. Prior to joining Kellogg, Mr. Rundle was associated with the Western Electric and General Motors Corporations in sales and management.

Mr. Mohr, former general manager of the Monroe County Telephone Co., Sparta, Wis., has been assigned to the Chicago Division under C. F. Cheney, division manager. His headquarters are in Sparta. Mr. Mohr has been associated with the Independent telephone industry in various capacities for over 26 years.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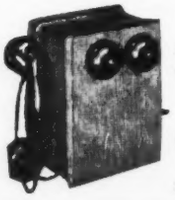

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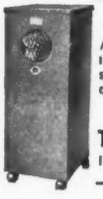

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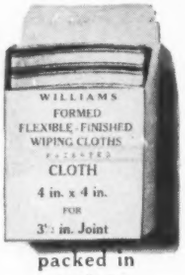

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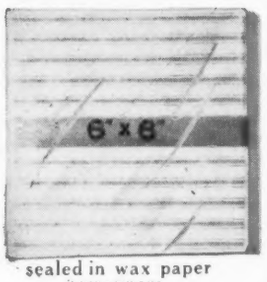

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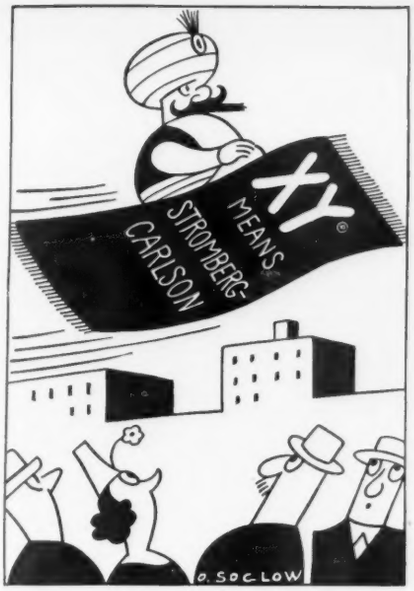

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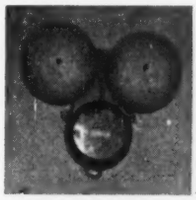

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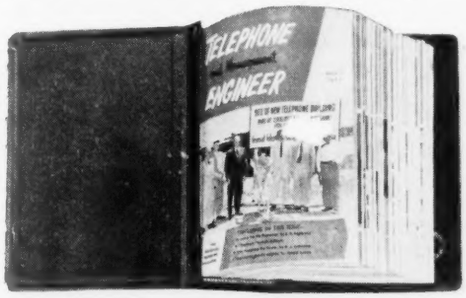

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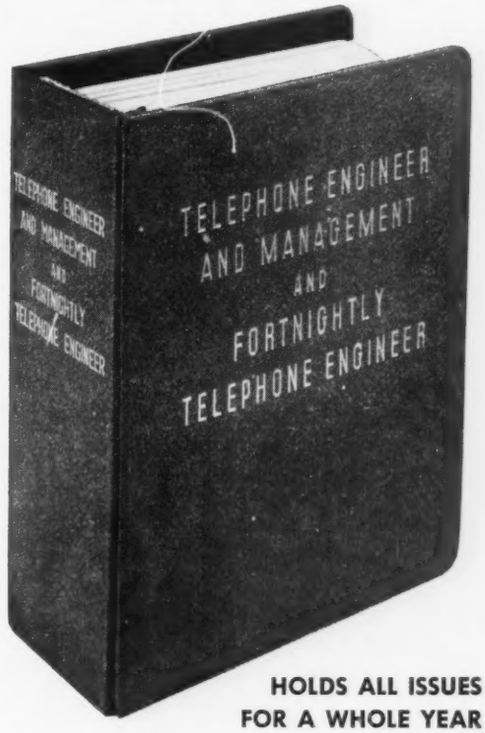

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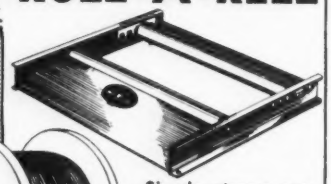

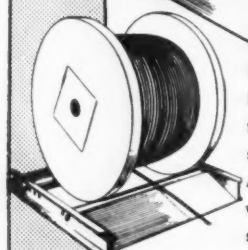

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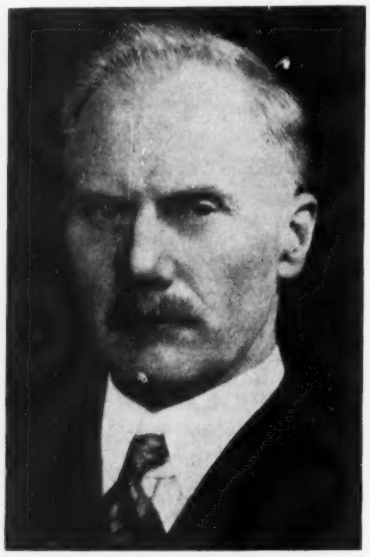
Charles J. Erickson, Strowger Pioneer, Dies

CHARLES J. ERICKSON, 84, died at Highwood Hospital, Ill., on September 28, 1954.

Mr. Erickson was the last survivor of the original Strowger development staff, which included the Erickson brothers, Charles and John, A. E. Keith, T. G. Martin, and E. A. Mellinger.

In 1893, Mr. Erickson and his brother John joined the Strowger Automatic Telephone Exchange.



CHARLES J. ERICKSON

Throughout his career with the Strowger company and later with Automatic Electric, he was engaged in mechanical and electrical design of Strowger switches until he retired in 1932. In 1938 he was selected to receive the fifth Talbot G. Martin Award. He had a total of 30 patents to his credit and participated in developing the piano wire switch of 1894, the dial type calling device, the automatic selection of an idle trunk, the basic form of the present Strowger two-motion switch, and certain vital parts for the first pay-station.

At the time of his death, Mr. Erickson was living at Lake Zurich, Ill. Mrs. Hazel Runkel, a daughter and Roy, a son, survive him.

Al Strong Dies

KELLOGG SWITCHBOARD & Supply Co., a division of International Telephone & Telegraph Corp., Chicago, lost its oldest-in-service employe and a man well known throughout the Independent telephone industry in the sudden death of Albert E. Strong, 71, on Sept. 24. Mr. Strong, who was in charge of special assignments for the works manager's office, had been with the company 52 years.

Just five days following his death, Mr. Strong's widow, Greta Hodges Strong, passed away following a long illness. She too, had been "with the telephone business" from early days. The daughter of the late Henry Hodges, owner of the Paola (Kans.) Telephone Co., she met young Al Strong when he was installing Kellogg equipment for her father's company in 1908.

Mr. Strong began his career with the Kellogg company as an 18-year-old messenger boy-engineer trainee Sept. 8, 1902. During his career, he served the company as plant superintendent, chief inspector and during the 20's and 30's served successively as foreman of radio assembly, switchboard assembly, telephone assembly and coil winding departments. During World War II, he was one of the company's two general foremen.

In his early days with Kellogg, Mr. Strong served as installer throughout the states and Canada. His interest in telephony actually began in the late 80's when his father, the late Albert L. Strong, installed the first local telephone system in his home town of Vail, Iowa.

Preformed Line Products Co., Cleveland, Ohio, has announced the appointment of JON R. RUHLMAN as technical director of the company's engineering and research activities. He succeeds Jess C. Little.

After receiving his B. S. degree from Purdue University, Mr. Ruhlman taught vibrations and structure at the University of Colorado while gaining his M. S. In 1952, he joined Preformed Line Products Co. as assistant technical director. He is an associate member of AIEE and a member of Tau Beta Pi, ASTM and IAS.

STROMBERG-CARLSON®

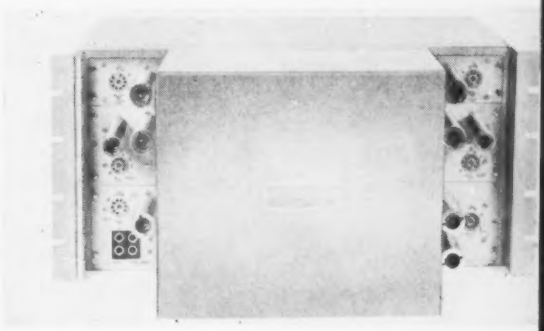
transmitter

Published by the makers of Famous XY® Equipment

VOL. 3, NO. 8 NOVEMBER, 1954

New Stromberg-Carlson Carrier Systems Meet the Needs of Any Size Company

Terminal units are mounted on a hinged gate; common routining is done from front, infrequent adjustments made with the gate swung open.



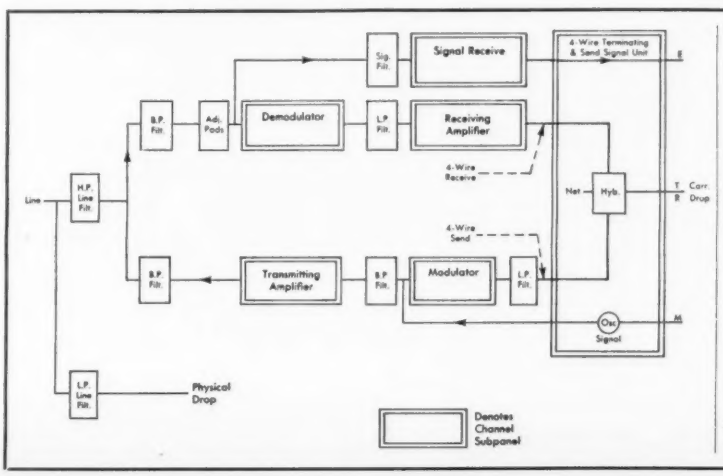
The series of articles devoted to Carrier principles and operation appearing in the trade journals recently point to the stepped-up interest in the method of operation by telephone companies of all sizes.

Stromberg-Carlson has spent considerable time and research in the endeavor to determine what are the most essential requirements of a carrier system to serve the Independent industry, and how best to provide this system so that it would be useable by the smaller as well as the larger operating companies.

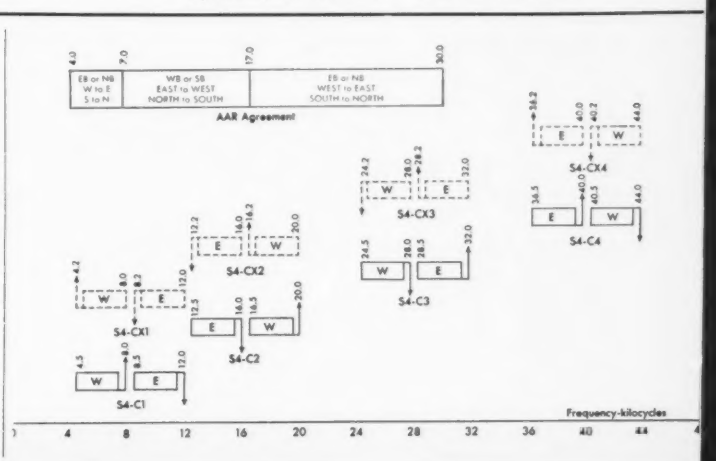
The Type S4-C System offers an expandable story-type system of up to four channels in the low frequency spectrum. The Type S12-O System provides similarly expandable equipment in the 36 to 160 kc range; a complete 12 channel system may be installed initially, or the system may be built up in units of four channels each. Where desired, the S12-O may be added to the first three channels of an S4-C, making a fifteen channel system.

In the design of the new Stromberg-Carlson Carrier Systems certain fundamental concepts were considered basic.

Block Diagram of S4-C Carrier Terminal.



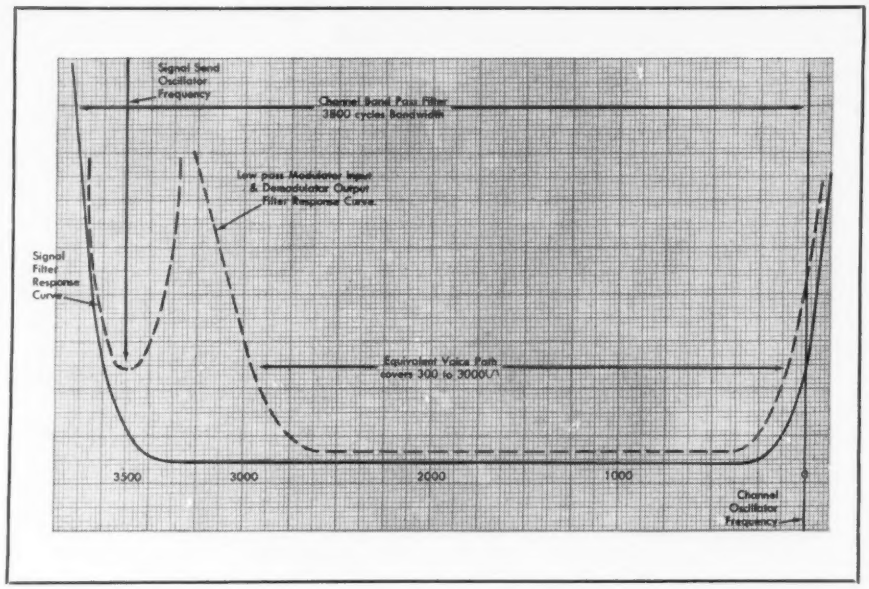
Frequency Allocations — S4-C Story System.



STROMBERG-CARLSON transmitter

1. Compatible with Others

The system should be compatible with other systems now available. The accompanying chart shows the frequency allocations for the S4-C system. The S12-O allocations follow the preferred A.A.R. specifications; this is the scheme generally followed by the Bell System.



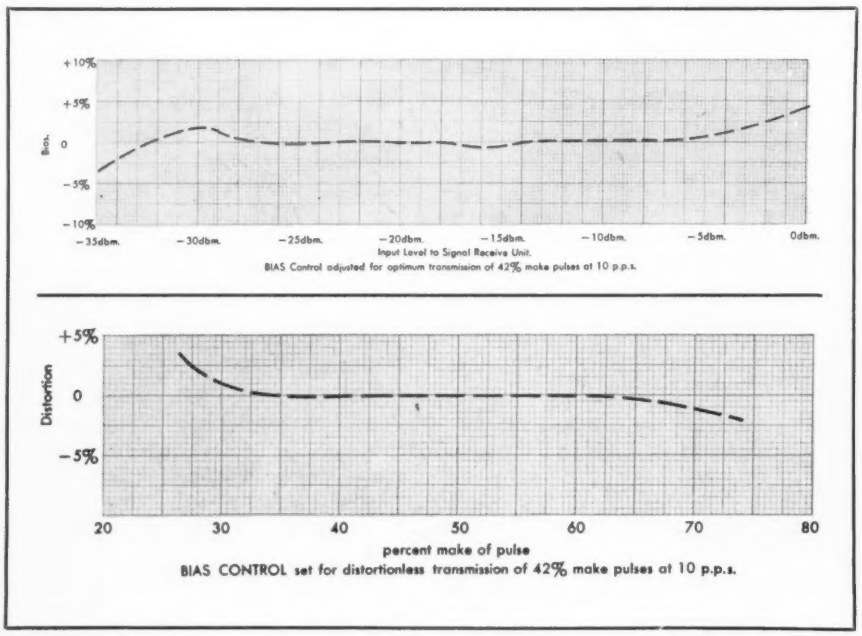
Utilization of a typical Stromberg-Carlson S4-C Carrier Channel Frequency Assignment. (Lower sideband, normal, condition illustrated.)

2. Minimum Preparatory Expense

The system should require the minimum expense in outside plant conversion. The S4-C and the S12-O permit operation of four channels on 30 kc transposed wires, and even on voice transposed wires when attenuation measurements indicate that no large impedance irregularities exist.

3. Maintenance Simplified

The system should be designed to fit both the "pull-out, plug-in-a-spare" and the "repair-in-place" type of maintenance. The S12-O is designed in this manner. The first procedure is usually followed by the larger operating companies; the "repair-in-place" — a Stromberg-Carlson feature — will appeal to the smaller companies that do not want to maintain an inventory of spare units for repair and testing purposes.



Signalling Characteristics — S4-C System.

4. Tubes Readily Available

The system should use standard commercial tubes. All tubes for the S4-C and the S12-O are commercial tubes available on the spot in radio parts and supply stores located in all cities and principal towns.

The S12-O and the S4-C Carrier Systems were exhibited at the recent U.S.I.T.A. Convention in Chicago. It was apparent from the interest shown and the questions asked that operating companies have been seeking a carrier with the combination of features listed above.

These and other features of the Stromberg-Carlson Carrier Systems, as well as information on Installation and Maintenance routines are covered in recently published bulletins. If you have not already seen them, ask for T-135 (General Description of the S4-C Four Channel Carrier System), T-136 (Engineering Bulletin on the S4-C System) and T-137 (Installation and Maintenance of the S4-C System), or the new brochure on the S12-O Twelve Channel Carrier System.

STROMBERG-CARLSON transmitter

After the Hudson Cut Is Over . . .

Anyone attending the U.S.I.T.A. Convention in Chicago knows about the XY Toll Ticketing System put in service in Hudson, Ohio, the preceding Friday, October 8. For those who were not there, this first subscriber toll dialing in the State of Ohio was a nice feather in the cap of the Independent Telephone Industry as a whole, and to the Western Reserve Telephone Company in particular. Our camera registered a few of the interested observers, while the charming editor of the Hudson "Times" prepared an outsized edition to record the event.

Left to right: Ralph Winter, Ohio Public Service Commissioner; Ted Case, Treasurer, and Mrs. Harry Case, President, Western Reserve Telephone Company; T. C. Thompson, Sales Manager, Stromberg-Carlson Co. at the cut-over of Hudson, Ohio, to XY Toll Ticketing and Dial.

Marcus Donaldson, left, Chief Engineer of Peninsular Telephone Company, Tampa, Florida, and Daniel DeHays, Secretary of the Ohio Independent Telephone Association, study the matrix panel of the Hudson, Ohio, XY Toll Ticketing installation.

John H. Voss, General Manager of the Telephone Division of Stromberg-Carlson points out an exclusive feature of the XY System to Baxter Case of Western Reserve Tel. Co.

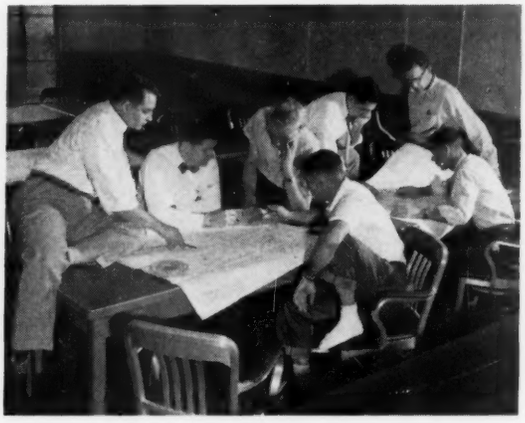
. . . Chicago is Taken by Storm

To borrow a phrase, "Colonel McCormick is really worried," as visitors to the metropolis of the mid-continent gang up at newsstands clamoring for the Hudson "Times." Your reporter, rain- and flood-bound at the Conrad Hilton, must rest his case on typical scenes within the hotel to prove beyond question that the *Tribune* and the *News* have had their day; that the most-read paper in Chicago is the upstart Hudson "Times."

(Upper right) "Pahdon ma Gowgia accent, but may Ah have a Hudson Times instead of this Tribune rag?"
(Lower right) As so often happens, wives have to wait until hubby finishes the paper before they get their chance.
(Bottom left) No need to identify this gentleman. Lovely lady somewhat upset at being ignored.
(Bottom right) The newspaper goes along on a short stroll between sessions.

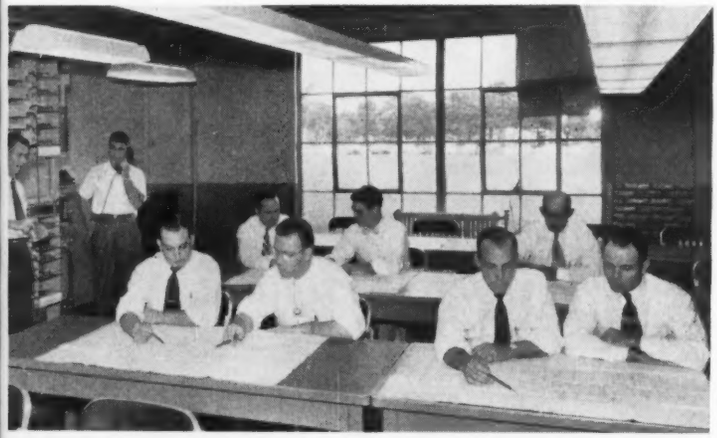
STROMBERG-CARLSON transmitter

In the XY School, all students are given ample opportunity to gain experience in adjusting, taking apart and putting back together the apparatus used in a typical XY System.



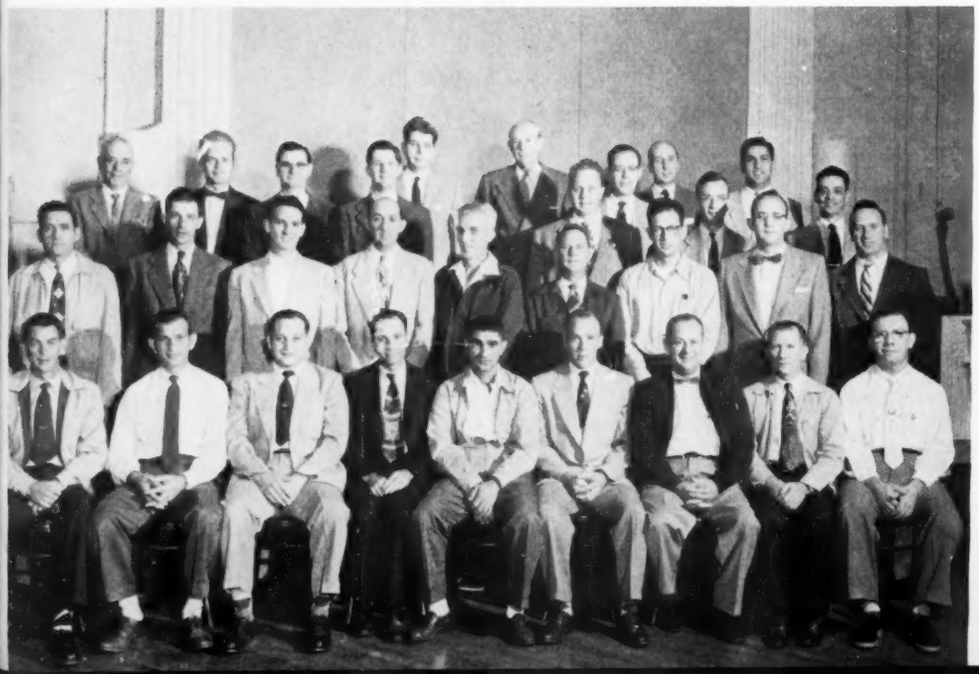
At the Saturday morning sessions the students really let their hair down. Here is where many individual problems are settled.

New Look Comes to the XY Training School



Formal lectures in circuit theory supply the necessary background for learning XY Dial System operation.

Students and instructors at a recent XY School line up for class photo.



The XY Training School, maintained over the years for the benefit of independent operating companies owning XY telephone equipment, has undergone "The New Look."

Relocation has permitted enlargement and reorganization to better serve the increasing enrollment demands. The school is located on the ground floor, away from the general manufacturing area. This, together with new sound absorbent walls and acoustical tile ceiling, provides a quiet area where concentration is easier. The rooms have been painted a pleasant two-tone green; a north exposure provides daylight supplemented by modern glareless fluorescent fixtures. Modern furniture, XY gray metal storage cabinets, and individual lockers for the students complete the transition.

In order to provide better facilities and give more individual attention to each student, two rooms and a separate office have been provided. One classroom is arranged for demonstrations and formal circuit discussion; the other is equipped as a laboratory. Here, with demonstration, guidance and repetitive practice in the common

routines, the students acquire skill in adjusting the various mechanical components of the XY Dial System. The class, which is made up of two separate sections, divides its time between the two rooms.

As has always been the practice, the prepared schedule may be altered to meet the needs or abilities of a section. For students with special or unusual problems, the instructors' office area adjacent to the classroom was made large enough to provide a conference room and a library of miscellaneous reference material of general telephone interest.

For the few students who may feel they wish additional opportunity for individual help, it has been customary to hold optional Saturday morning review-discussion periods. These are always kept as an informal round-table discussion. They also provide an opportunity for the students to check on the special features of their particular office.

The teaching method employs standard circuit drawings. Each student has a personal copy to "mark up" in any manner that may help

George W. Killian, instructor in charge of the XY training school.

him. These prints are supplemented by the Circuit Descriptions, various technical publications issued by Stromberg-Carlson, and special teaching aids that have been prepared by the school staff.

The XY Training School comes under the general supervision of the Telephone Engineering Laboratory. George W. Killian is chief instructor; the augmented full-time staff includes Angelo R. Aschettino, John Metrick, Chris Pappas and Eugene Scheel. As before, the resources of the full Engineering Department are available on a consulting basis.

WE'D LIKE YOU TO MEET

Herbert J. Kiesow

Roy W. Jones

Herbert J. Kiesow

Few people at Stromberg-Carlson follow the baseball season with more understanding than Herbert J. Kiesow. For the present Production Control Manager nearly became a professional ball-player, receiving several offers from the Minor Leagues and a feeler bid from the Detroit Tigers.

Although Herb still plays a "mean" game of soft ball, and coaches his son's Little League team, he is glad he cast his professional lot with the telephone industry. From the beginning his job has been to "get the orders out" — first as mail order clerk, then as expediter for switchboards, and in the recent past as Assistant Production Control Manager.

During World War I Herb was drafted and actually left for duty, but the Armistice was declared just before entraining. World War II found him in supervision of a large group of "men behind the men behind the guns" as Stromberg-Carlson was asked to produce much new and vital communications equipment for the Armed Services.

With the post war expansion of the telephone division at Stromberg-Carlson, over 175 people now report to Herb, representing the many facets of production planning and materials flow. His specialty is ferreting out bottlenecks; when the lights burn late, it is apt to be Herb working out some way to expedite an XY equipment order to its future home.

After a particularly busy day, Herb enjoys nothing better than his hobby of cartooning — begun in high school and still a highlight of management meetings.

Married, with two children, Herb still finds time for civic and fraternal interests; he is an officer in his church and local scout troop and an active member in the Telephone Pioneers.

Roy W. Jones

Every manager needs, and leans heavily upon, a capable administrative assistant. Howard Strassner, Production Manager, is extremely fortunate to have Roy Jones as his staff assistant.

Roy may not be as well known to telephone men on the outside as his twin in name, Roy Jones — no relation — who is chief of circuit design. Each has many interesting sidelights on the other's work when phone calls or letters are accidentally switched.

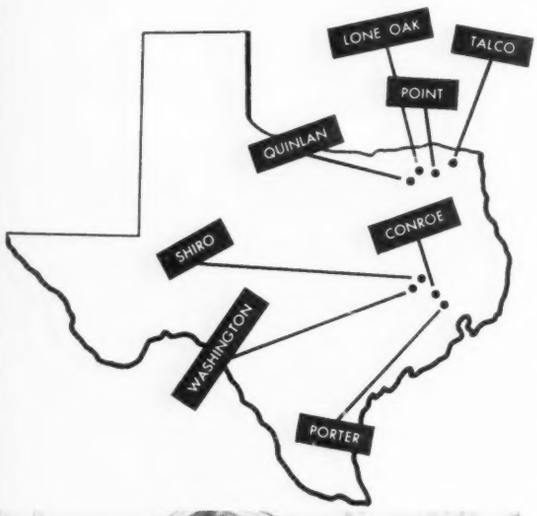
In college Roy specialized in Business Administration. After several years experience with the Kraft Cheese Co. as auditor, he came to Stromberg-Carlson just before Pearl Harbor, plunging into the hectic maelstrom most companies faced as they re-tooled for war production. In the post-war re-shuffling to a civilian economy, Roy was Chief Dispatcher and then Supervisor of Planning and Scheduling.

Like Herb Kiesow, Roy enjoys playing baseball, but a rival hobby — antique automobiles — competes for his limited spare time. He has accompanied his son David into the Cub Scout program — wife and daughter Pamela share Roy's interest in gardening and music. His church has elected him to the board of deacons. And if an emergency should strike, Roy will do his part as a Civil Defense Warden.

STROMBERG-CARLSON transmitter

Over 34,000 Lines of XY in Texas!

Big Texas does things in a big way. Here are a few of the recent cutovers that have boosted the Lone Star State's total to over 34,000 lines of XY.



Talco, Texas — 140 Lines XY

In the oil and farming country, Southwestern States Telephone Co. cut over its Talco exchange to XY Dial on Monday, September 27. The new XY System has 140 lines. At right: relaxing after cutover are Miss Nettie Lyman, traffic; Earl Daniels, equipment superintendent, Brownwood, Texas; W. Davidson, contractor-installer, Stromberg-Carlson; and W. T. Moore, division manager, Henderson, Texas.

Porter, Texas — "Model Exchange"

Standing in the doorway of his "model exchange" at Porter, Texas, is Edwin Kersh, plant superintendent and engineer of the Home Telephone Company, of Humble, Texas. A University of Texas graduate, Edwin has built the Porter exchange letter perfect, installing a small but efficient XY Dial system last spring. Subscriber acceptance was so overwhelming that the telephone company is already expanding the exchange to handle increased business.

Vester Kersh, general manager of the Home Telephone Company, and Edwin are now looking to the future when their Humble, Texas, exchange will be cut over to dial operation.

This replica of Texas' first capitol building stands in Washington State Park.

Navasota Telephone Co. Becomes 100% XY As It Cuts Over Shiro and Washington

Mr. James F. Martin, president of the Navasota Telephone Co., wanted everyone in the Navasota trading area to have the finest telephone service possible.

So he cut over his Navasota exchange to XY Dial, then purchased the Anderson, Richards and Shiro exchanges and ordered XY equipment for them. For each of these exchanges he built an entirely new plant, and recently he completed his final cutover to XY, at Shiro.

But that still was not enough. At historic old Washington, cradle of the Texas Republic, he found service was being provided by a wall type magneto switchboard. This was soon changed when Mr. Martin purchased the Washington exchange. Not far from the site of the signing of Texas' Declaration of Independence, he built a modern new exchange building and installed an XY Dial System.

Public service goes far beyond providing good telephone service, in Mr. Martin's mind. For the people of Grimes County, he has also built a 20-acre park, with a modern ball diamond, rodeo stadium, and lots of recreation area for the good citizens.

Mr. George Franks, plant superintendent and vice president of Navasota Telephone Co., examines XY equipment in Washington exchange.

STROMBERG-CARLSON transmitter

Quinlan Telephone Co. Converts 3 to XY, and Takes 2 New Exchanges Under Its Wing

When Dee Cole gets an idea there's no telling where it will stop!

Two years ago, his Quinlan Telephone Co. had four exchanges, three of them manual. With characteristic vigor, Dee Cole entered into a program of converting Lone Oak, Point and Quinlan to XY Dial. Quitting his job as a communications engineer for the Texas & Pacific Railroad, he devoted all his energies to the project, and has now completed the job.

With XY Dial on the job, did he relax and go fishin' as he well deserved to do? No. He immediately purchased the exchanges at Emory and Alba, and has already started modernizing them.

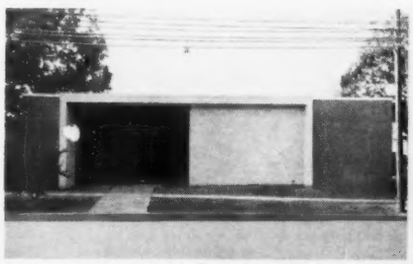
Mr. Cole is ably assisted in his enterprise by Mrs. Cole, sons James and Tommy, and Mrs. Gordon Hughes, sister of Mrs. Cole.

THE IRREPRESSIBLE COLES: Tommy, Mrs. Cole, James and Dee Cole.

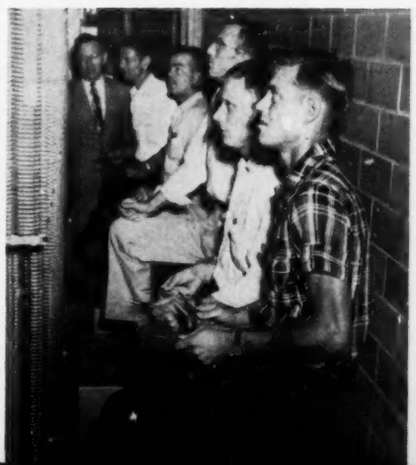
AT LONE OAK CUTOVER: L. to r., Gay Smelzer, Northeast Texas Telephone Co.; W. J. Riley, Stromberg-Carlson; Dee Cole, owner of Quinlan Telephone Co.

NEAT, MODERN exchange buildings house XY systems at (l. to r.) Quinlan, Point, and Lone Oak.

Gathered 'round for Conroe cutover: men, l. to r., are John Harris, chief engineer and Marion Clay, general manager of Lufkin Telephone Exchange; Bill Riley, Stromberg-Carlson; Morris Bateman, Conroe manager; Dr. L. H. Denman, president of telephone company; Charles Fisher, R. H. Winslow, Carl Price, all of Stromberg-Carlson. Women: Mrs. Clay, Mrs. Bateman, Mrs. Price.



New home for new CDO at Conroe.



This is it! Waiting for that first call on Conroe's new XY System.

Conroe Cuts to XY . . . Largest CDO in Texas

2,000 line terminals . . . 3,000 connector terminals . . . and 25 toll circuits direct into Houston, forty miles to the south.

That's the equipment centered in the CDO at Conroe, Texas, where the picks were pulled on a brand new Stromberg-Carlson XY Dial System this fall. At the present time, this qualified Conroe as the biggest CDO in Texas.

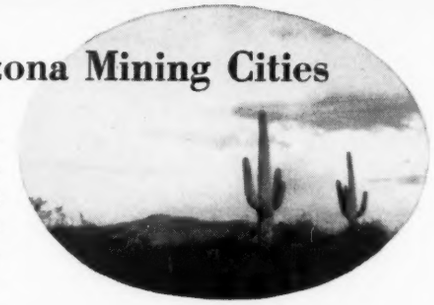
Dr. L. H. Denman is president of the Lufkin Telephone Exchange, which operates the Conroe system. Marion Clay is general manager; Morris Bateman is Conroe manager; and M. John Harris is chief engineer.

Conroe, the county seat of Montgomery County, has a population around 9,350. It is primarily a commercial trading center for the surrounding area, which is devoted mainly to oil and gas production, and lumbering. Farming and cattle raising are also extensive.

Telephone service was begun at Conroe in the late 1800's, and incorporated as the Conroe Communications Company in 1899. It was sold to the owners of the Lufkin Telephone Exchange in 1929.

STROMBERG-CARLSON transmitter

First of Two XY Exchanges Cut Over for Arizona Mining Cities



Telephone Building, Hayden, Arizona.

Mr. C. C. Fanning (left), manager for Hayden and Ray, accepts congratulations from R. H. Phelps, Stromberg-Carlson representative.

Several months ago Mr. C. C. Fanning, Chief Electrician for the Kennecott Copper Corporation and Plant Superintendent of the Ray Electric and Telephone Company — a wholly owned subsidiary — began the planning for the XY Dial exchange for the company towns of Ray and Hayden, Arizona. This modern telephone service is in line with company policy — everything one needs for a complete, happy life in company towns. The vast ore lodes in the vicinity indicate a long-term operation, and the telephone planning also looks to an assured future. With this in mind, Mr. Fanning took advantage of the privilege extended to customers to study at the XY Training School in Rochester.

Bob Phelps, Stromberg-Carlson representative, writes of racing thunder storms, hoping fervently that none of the "dips" were inundated by flash floods, and dodging herds of cows being driven to winter feeding grounds, as he sped to the 8:00 A.M. cutover. Once there, the change to dial went without incident, and operator toll dialing was put in service to Tucson, Phoenix, Los Angeles and San Francisco.

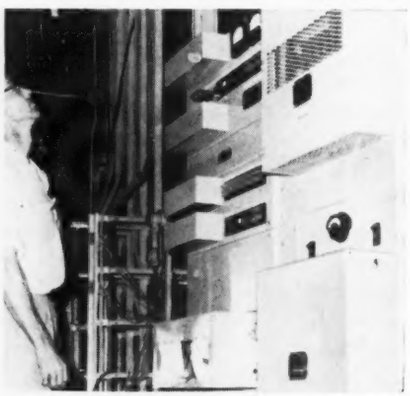
The last calls on the old switchboard were handled by Mrs. Alene Goodwin. Mrs. Guyer, charming wife of Nathan Guyer, purchasing agent for the company, received the first calls over the gleaming new Stromberg-Carlson No. 3 Toll Board.

Mr. R. M. Heizer, Traffic Chief of the Mountain States Telephone and Telegraph Company and Miss Margaret Turnbull, District Instructor, were present to lend valued assistance.

In a short time the Ray Electric and Telephone Company will complete their dial program with the conversion of the Ray office to XY CDO operation, working into the Hayden toll center. The Kennecott employes in both communities will then have a telephone system second to none.

To Dan Monaghan and Ray Kohoutek, Stromberg-Carlson installation supervisors, a "well done" from the company.

Twin Lakes Company Cuts Forsyth (Mo.) XY



Mr. Malcolm Sherwood, Branson, Mo., watches power board at XY cutover.

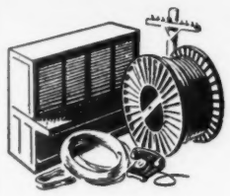
Mr. Malcolm Sherwood, President of the Twin Lakes Telephone Company of Branson, Missouri, has finished the first part of his dream, as the Forsyth exchange was cut over to XY Dial. Matching his original investment 10 for 1, and working long hours every day, Mr. Sherwood can well be proud of his accomplishment.

The XY System is arranged to handle anticipated expansion of telephone service to neighboring towns. The next step in the program is the installation of XY equipment for the combined Branson-Hollister area.

Mrs. Bessie Biggs, faithful operator for the last four years, is busily planning how to make a living porch out of the old switchboard office in her home. One of the first steps in the dial program was to build a new building to serve the expanding telephone needs of the community.

Published by Stromberg-Carlson . . . makers of Famous XY Equipment

"STROMBERG-CARLSON" AND "XY" ARE REGISTERED TRADE MARKS OF THE STROMBERG-CARLSON COMPANY, ROCHESTER, N. Y.



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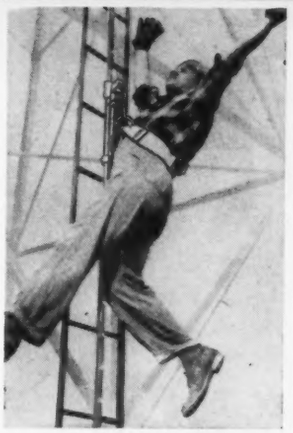
You Can't Fall
IT'S A LIFE SAVER



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Easy and inexpensive to install: Clamps to rung, peg, pole or frame. No welding or cutting.
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The Back Of The Book

By JOHN G. REYNOLDS

Dennis the Menace

POLICE IN Braintree, Mass., probably wish a recent visitor to their hoosegow would pick on someone his own size. The nightmare began when they spotted a three-year-old lost boy and brought him to the station for a couple of hours, during which he: 1) dumped over the files by pulling out the drawers, 2) put the teletype out of order, 3) disrupted telephone communications by punching the buttons that switch calls, and 4) beaned a lieutenant with a flashlight. At that point the search for the little darling's mommy and daddy began in earnest.

Gullible's Travels

A HOTEL DESK clerk in Reno, Nev., will be wary the next time someone calls and says the building is on fire. A woman telephoned him recently and cried: "There's smoke coming from the top floor of the hotel." The clerk raced up three flights to investigate. By the time he got back, $9.65 was missing from the cash register.

"Natural Question"

AS EVERY ONE is aware telephone service is provided on a twenty-four hour a day, seven days a week basis. According to "*Long Lines*" magazine, this fact apparently was uppermost in the mind of a Galveston resident when he recently went to the telephone building to pay his bill.

It was after hours and the business office was shut. After a few futile efforts to rouse some one, he finally stopped a young operator who was passing through the hall on her way to work and asked what was the matter.

"I'm sorry, sir," she replied, "but the business office is closed for the day."

"Ma'am, I'm real sorry to hear that," said the Texan. "Tell me," he added sympathetically, "did you know the person who died?"

Safety Slogan In Court

PRESIDING Judge J. J. Quillin, of Portland's Municipal Court, has a new helper on the bench—a copy of the "take time" slogan that has guided telephone people in accident prevention for years.

According to *Pacific Telephone Magazine* Judge Quillin's own appraisal of its effectiveness is as follows.

"The Bell System has made a definite and positive contribution to the wholesome literature of safety with its slogan '*No job is so important and no service is so urgent — that we cannot take time to perform our work safely.*'

"I have found that the people who observe this slogan in the court room respond in a very satisfactory manner, and I am confident that no one can estimate the tremendous good that has been accomplished by it."

Judge Quillin knows first-hand the high cost of careless haste in terms of human suffering. Day in and day out, citizens stand before him charged with traffic violations that could take a life — their own, or that of an innocent person.

Punishing wrong-doers is a judge's legal duty. But Judge Quillin does more than sentence the guilty. He uses each case he hears as an object lesson in teaching the gospel of safety. And the Bell System slogan displayed in his court room is a basic part of his text.

Telephone men and women everywhere can be proud that their personal code for accident prevention has been given this important role in the promotion of public safety in Portland.

Cuban Love Story

BEFORE Mayor Impelliterri left office he forwarded to AT&T a letter he received from a young Cuban named Juan, after a visit to New York. Juan's girl had asked him to bring back, as a present, a Manhattan directory. Juan had paid $4 (to city slickers) for the book and then had lost it. His lament continued: "She don't believe me. You know the women! She thinks I forgot to fetch the directory. She don't believe I spent $4.00 dollars in a woman whim. Oh who invented girls? Will you be so kind as to sending me a phone directory? I am in love. I don't want to lose her. When you was a boy, sure you was in trouble for a girl and perhaps somebody help you then. Tomorrow I will help some boy. We are only the strong sex, but they are the fair sex. What a sex! Will you? Thanks a million." Needless to say, AT&T sent Juan a free directory post haste.

Big Payoff

WORKMEN performing some neglected housekeeping recently in Philadelphia's city hall removed some 30-year-old telephone booths and came up with unexpected treasures. Discarded by telephone callers through the years were a dozen newspapers dating back to 1935, a flag of the Philadelphia Sesquicentennial exposition held in 1926 and three bottles of what appeared to be Prohibition-type rum.

Compare the fast, easy Nicopress Line Splice with older methods . . . just do this

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2 INSERT WIRE IN SLEEVE

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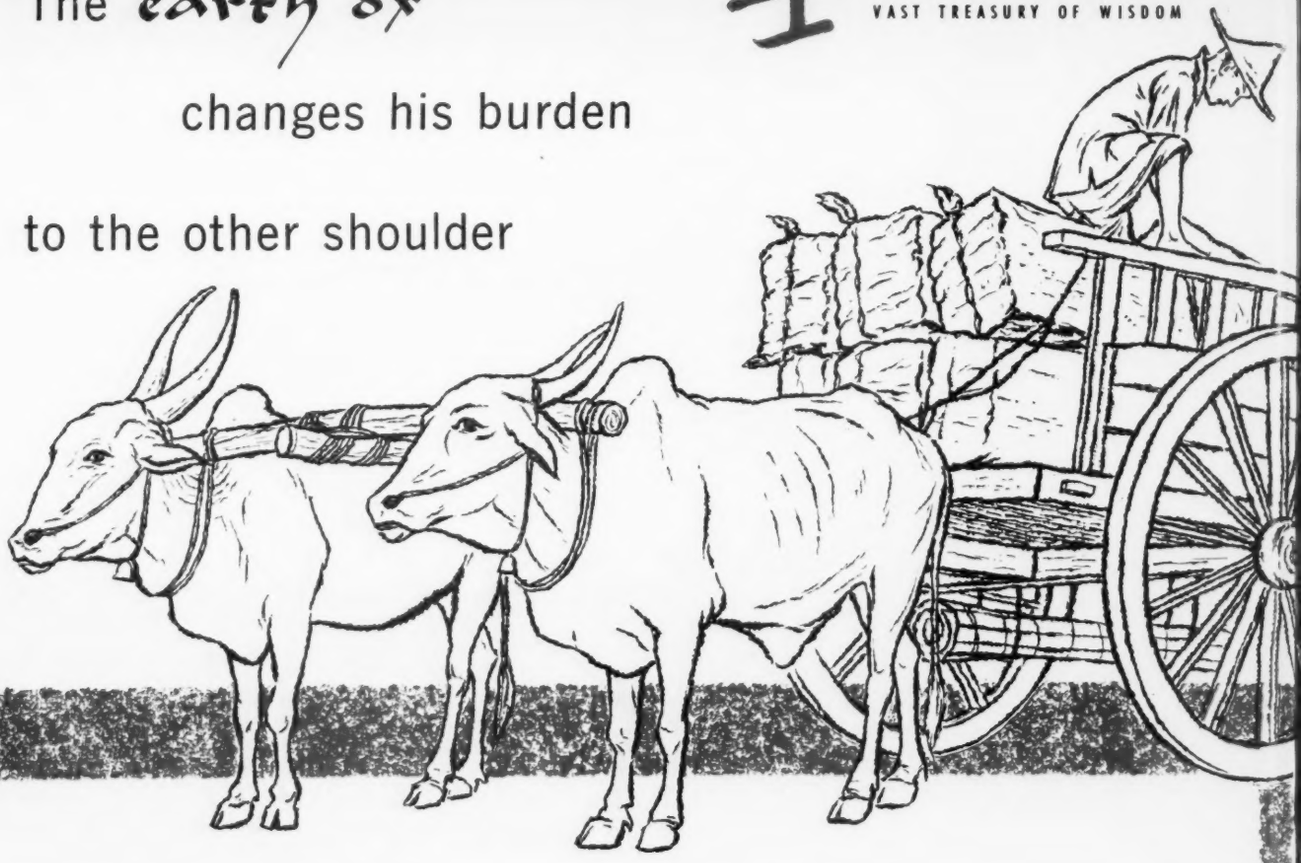
ANCIENT CHINESE PROVERBS
PROVIDE WESTERN MAN WITH A
VAST TREASURY OF WISDOM

The earth ox changes his burden to the other shoulder



Why not shift the burdensome, time consuming details of publishing your directory to the broad, capable shoulders of General Telephone Directory Company?

Over the past twenty-five years, more and more independent telephone companies have wisely chosen to employ our Complete Directory Service Plan. As a result, these companies not only take pride in providing their subscribers with more accurate, more attractive telephone directories, but they also realize greater net profit.

Our organization can do an equally effective job for your company—large or small. At your invitation our representative will provide you with an accurate evaluation of the potential net profit which you should expect from your telephone directory. This evaluation is available to you without cost or obligation, and will clearly show you the advantages to be gained by shifting the burden to our shoulders.

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